GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXIII. No. 3143.] LONDON, AUGUST 8, 1923. [75TH YEAR. PRICE 1s.

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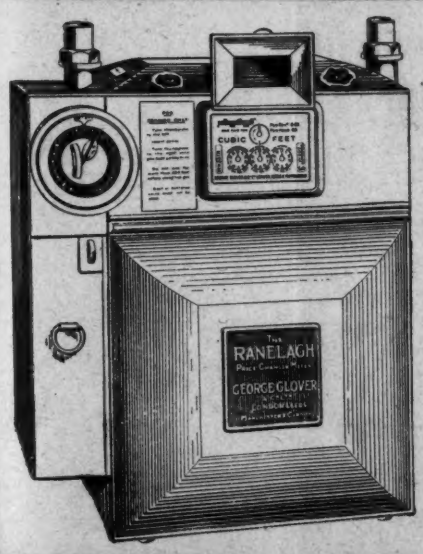

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VOL. CLXIII., No. 3143.] WEDNESDAY, AUGUST 8, 1923. [75TH YEAR.

EDITORIAL NOTES.

Investigation of Special Orders.

THE Director of Gas Administration (Mr. H. C. Honey) has held inquiries recently into the applications of the Uxbridge Gas Company and the Newbury Corporation for Special Orders under section 10 of the Gas Regulation Act. The former contains an agreed scheme for welding the Maidenhead Gas Company's concern with the Uxbridge undertaking; and the Newbury Corporation Order proposes an extension of the limits of supply. Both Orders were opposed. Our principal object in calling attention to the inquiries is to show how completely the proceedings dispose of any argument that, if opponents are not pleased with the decisions of the Board of Trade, they should have the further right to carry their hostility into Parliament, and have additional investigation by a Committee there. Naturally, when there are two parties in conflict, the losing side cannot be filled with satisfaction; and, if contentiously disposed, they are sure to proceed to the utmost limits in the effort to effect their end. We have pointed out before how this cumbrous procedure annuls the simplicity and raises the expense of obtaining powers to do ordinary and commonsense things in the public interest in connection with gas supply. In fact, if opposition to Special Orders is carried to the length of conflict in the Parliamentary Committee rooms, then obviously it becomes a question whether the cheaper and less troublesome route will not be to pursue the old method of direct promotion of a Bill in Parliament to obtain an Act. We should be extremely sorry to see a reversion to this plan in cases where a Special Order would suffice; but this is what promoters will be driven to, if there is a growth of opposition to Special Orders at the confirmation stage. We do not at present know, neither do the promoters or opponents, whether this will be the case in respect of the Uxbridge and Newbury Orders. The opponents, of course, cannot come to any decision until they have information as to the recommendations of the Director of Gas Administration to the Board of Trade, and learn whether the Board acquiesce in them. We have, however, had one example of opposition—the Barnsley case—being carried to the parliamentary extremity; and this, in our opinion, should be discouraged, and not, as it has been, encouraged.

The point has been made that the inquiries at the Board of Trade (or by the Electricity Commissioners in the case of Electricity Orders) are not of the same searching order as are those by a Committee of Parliament. This we distinctly deny. As evidence, we refer to our reports of the proceedings before the Director of Gas Administration. To our mind, the tribunal at the Board of Trade is better qualified than any Committee of Parliament to adjudicate upon matters affecting gas supply. The main reason for this view is the superior qualification of the former. This is a matter in which the gas industry is deeply concerned; and therefore we cannot avoid introducing a personal note, though in this connection we prefer to write and think of the Director of Gas Administration in his official capacity, and not of him as Mr. Honey. The gentleman occupying this official position is altogether disinterested as between promoters and opponents; so are the members of Parliamentary Committees. But the difference comes in that no member of a Parliamentary Committee has lived into legislative gas affairs, or knows the history of the gas industry with the same thoroughness, as does the Director. For attestation of this, we need go no farther back than the illuminating statement which the Director made before the Therm Charges Committee, which showed a master of the subject in hand in its every detail. And again generally recognized are the care and justice of his decisions on standard and maximum prices in relation to the conditions of the times at which the applications are made under section 1 of the Gas Regulation Act. In view of disinterestedness and impartiality, together with special knowledge and therefore qualification, we would much sooner entrust both inquiry and decision to the Director than to a Committee of Parliament, however conscientiously they try to perform the duty confided to them.

We have examined carefully the proceedings before the Director at the Uxbridge and Newbury inquiries. There is no indication of perfunctoriness about them; there is all the evidence of thoroughness. No Committee of Parliament, unless they permitted the proceedings to be protracted to no useful purpose by going into the by-ways of minor detail, could have had more essential information placed before them. Counsel recited and argued the facts before the Director, gas consultants gave evidence, as well as those responsible for the administration and executive management of the undertakings, and the witnesses were examined and cross-examined—just the same as they would have been had the case been presented to a Committee of Parliament. In view of all this, it seems to us that, to go over the whole matter again on an Order being submitted to Parliament for confirmation, is supererogation, and a futile expenditure of money and time.

On these grounds, we add the argument of experience at these inquiries to the views expressed on previous occasions, as to the unnecessary latitude permitted to opponents in proceeding with opposition from the Board of Trade to Parliament. In the case of both these Orders (there may not be further opposition in respect of them), we can detect nothing that could be placed before a Parliamentary Committee that was not before the Director of Gas Administration, and upon which he will, in deciding upon the recommendations to the Board of Trade, bring to bear a trained mind and special qualification and knowledge. We have no cognizance as to the views of the Director himself on this particular subject. As an official of a Government Department, he would not tell us—even if he has formed an opinion regarding it. But for own part, we must examine the matter from the point of view of the gas industry. Hence the protest against making the obtaining of additional statutory powers more complicated and expensive in both money and time than there is any occasion for. The best way to help a statutory industry to serve the public is, consistent with competent investigation of proposed new or additional powers, to ease and lighten the way of obtaining them, and not to make the conditions of doing so as onerous as possible. This is what dual investigation means; the Gas Regulation Act was framed with the former intention in view. That intention has been vitiated by the reactionary step of permitting opposition up to the last stage of the progress of a Special Order.

The Policy of Amalgamation.

IN section 10 of the Gas Regulation Act, sub-section 2 (*d*), it is enacted that the Board of Trade may, by Special Order, "authorize arrangements for the purchase by agreement, "joint working, or amalgamation of undertakings, including "necessary provisions with regard to the capital of the "combined undertaking, the vesting of the property and "rights of the purchased or amalgamated undertakings, and "other necessary incidents and consequences of purchase, "amalgamation, or joint working." One need not wonder

why this provision was deliberately put in as part of the section. It was because, generally speaking, within fairly extensive areas, greater economies and higher efficiencies in various directions can be effected by concentration of gas production upon a site with good facilities for the reception and despatch of materials than is possible by the separate existence and working of a number of small undertakings. That is a proposition which is generally acceptable, though, we grant, with exceptions to its application. In considering the Uxbridge Special Order in which authorization is sought to the amalgamation of the Maidenhead Gas Company's undertaking, the Director of Gas Administration heard that there is disagreement on the subject. The Corporation of Maidenhead seems suddenly and ardently to have become possessed of a desire to purchase the concern; but they have not yet secured the sanction of the ratepayers to the proposal. This in itself conclusively shows that there has been a rapid conversion to the desire for municipal ownership. Mr. H. E. Jones, Mr. George Evetts, and Mr. Arthur Valon were all favourable to the amalgamation. Mr. G. M. Gill, on the other hand, was opposed to it; and yet he has had association with two large Metropolitan Companies which are the product of amalgamations of smaller ones, and both Companies are doing exceedingly well. Admitted that circumstances alter cases, one has to examine the circumstances to ascertain whether they are such that amalgamation is desirable. If the conditions are of a kind that render amalgamation the correct policy in the public interests, then the mere transfer to the Corporation would not materially alter the position—the position, in fact, might be worsened, in view of the detachment of the concern from the personal interest that is present with private enterprise.

No one had any complaint to make as to the management of the Maidenhead Gas Company. Mr. G. N. Keen, who appeared for the Corporation (Mr. W. G. Jeeves, K.C., represented the promoters), submitted that it was because of the public spirit of the Company in the past that the consumers had been so well supplied with gas, and were pleased with the supply. The matters for examination are not what has been done in the past, but what are the present conditions and the prospects; also whether in view of existing circumstances and the prospects, the Maidenhead undertaking would be able to run better alone now or in union with some other concern. It is just possible that if Mr. Keen could detach himself from the years that have gone and look into the future, he would find that the public spirit displayed by the Company in the past is equally displayed in the present by their agreement with the policy of amalgamation as encouraged by the Gas Regulation Act. It might be he would learn that the Company have realized what he himself has manifestly not yet realized—that, in the circumstances of the times, they would not be able to do so well in the future in separate state as they have done in the past. In connection with gas supply, there is to-day little use in looking back; one has to look forward, because the conditions have completely changed. There is no value in trying to gauge the future by the past—the costs of coal, oil, materials, and labour are all higher; and there is little prospect of their reaching pre-war normality again, or at any rate, for many years. It is generally agreed that the Maidenhead carbonizing plant is no longer adequate; and the fact that the Company have to supply no less than 50 to 60 p.ct. of water gas, speaks volumes as to the shortage of their capacity for coal-gas production. It is conceded that a large amount of capital would have to be spent; and the advice that the Company have consistently received is that new plant should be constructed on a new site, and that money should not be expended in patching-up the plant on the existing congested site. Mr. Gill is of opinion that he could effect alterations on the present site that would increase its productive capacity by 50 p.ct., by spending some £16,000. Much more capital than this would be required for new works. All the same, one has to look ahead; and what is not spent now would—with the Maidenhead Company pursuing a separate existence—have to be expended in the future. Even the expenditure named by Mr. Gill would mean a large additional responsibility in the way of capital charges; and it is a question whether, taking a broad view, and examining carefully the prospects as to circumstances, the consumers in the combined area—not only those in the Maidenhead district—would not be better served and progressively at a lower price by consolidation than they are likely to be by the continued separate existence of the two undertakings. That is a point the Director of Gas Administration will have in mind; public interests and policy not being confined to a single district. The accrued experience from previous amalgamations has been that the areas annexed have been considerably benefited through the improvement brought about in resources by the union, and from which higher economies and efficiencies have been realized than were previously possible. If this was the result with pre-war conditions, then how much more should it be the result in the more onerous circumstances that now prevail, and are likely to continue. There has been an easing-off. But the costs of coal, labour, structural materials, delivery, and erection, give no promise of descending to their old levels. It is bad to legislate only by the guidance of the past; available presage should not be ignored.

Selling Illumination.

New times, new thoughts and methods. We have been in the habit of selling the necessaries for lighting; the present ideal is to sell illumination. Means of lighting have hitherto been sold with, attached to them, their consumptions and the duty rendered per cubic foot of gas or per unit of electricity. But for purposes of illumination it must be admitted that this is a very defective method, and scientifically unsound. Lamps may consume so much gas or current; they may, measured photometrically at given angles, supply a certain quantity of light. But this is not the end of the practical purpose of the lighting agent. Different sources of light have different wave lengths—their illumination may be highly concentrated or well diffused. Certain of them give their greatest illumination in an almost horizontal direction; others at totally different angles. It is necessary then in some cases to have recourse to diffusing media, which accessories cost money. This is essential if good illumination for specific purposes is to be obtained; and this is where the art of the illumination engineer comes in—giving us scientific illumination in place of the haphazard lighting methods that have obtained in the past.

The idea of selling illumination is a good one up to a point. If we can get the public to appreciate that they should only purchase those appliances which will give them the illumination they require, whatever the purpose—whether it be for certain work at a given place, or for a definite object such as the lighting of goods in shops or shop windows, or for street purposes—something advantageous will have been achieved. Satisfaction and economy must result. Though illumination will not actually be the basis of charge, the public will be able to secure what they require if they can be educated up to the idea of buying only those appliances that will furnish them with the illumination desired, with sources of light that will not be injurious to the organs of vision. Beyond that, the ideal cannot be carried. Illumination as the basis of charge cannot be established. The public cannot say to the purveyors of gas or electricity: "We want so "many foot-candles here and there, what will you charge "us for them?" However, the education of householders, shopkeepers, factory owners, and others, to the idea of purchasing means of lighting that will give them the quality and quantity of illumination required is sound.

In this matter, the gas industry must keep their eyes on their competitors. An opening has been made by an influential electrical company in this direction of cultivating the illumination idea. There is something in it; something, in our view, that is worth emulating. In short, it is a stride forward—just as is the change from purchasing gas by volume to buying it per unit of heating value. The British Thomson-Houston Company, in connection with electricity, are pioneers in this matter. They have opened a Lighting Service Department in London—to be precise, at 15, Savoy Street. A large demonstration room has been fitted-up, equipped with all the requisites for a lecture-room. But it is fitted with something more. At present, there are many types of lamps connected up such as should be or should not be used for industrial and shop purposes. The object of this variety is to demonstrate by contrast the results of using efficient and inefficient lamps. The comparison will be sufficient to set the inspecting user against the application of lamps that come into the category of the inefficient and uneconomical. By this means, it is hoped to convince people that the correct thing is to purchase the light needed, and not lamps, fittings, and reflectors. It is the right idea. Good lighting is necessary to maximum output in industry; and it helps to prevent accidents. Obsolete lamps with their inadequate light, and gloomy and de-

pressing effects, are not what the worker requires. The shopkeeper wants his windows brightly and attractively illuminated, without glare. He wants to sell, and so his customers must see the goods under the best, and not under repelling, circumstances. The enterprising Company are going to carry the gospel of illumination into the realms of the household, the office, and the streets. This is a movement that should be marked.

The "Electrical Review," in noticing the development, urges co-operation on the part of the trade generally. It suggests there is great scope for the new department of the "B.T.H." Company—both in respect of education and research. Obviously, in the view of our contemporary, the new work will do something to transfer consumers from gas to electricity. This is found in the following passages: "The general standard of lighting is low; and there is "enormous scope for the extension of the use of the electric "light. In London, with a population of 4½ millions, there "are only some 214,000 electrical consumers, compared "with 1,637,000 gas consumers; and the same holds in "greater or less degree throughout the kingdom. What a "field to work in!" We agree. The field, however, has been there for a long period; and during that time gas lighting has been growing in efficiency and economy. It is more difficult now than formerly to get transfers from gas to electricity; and live gas men will see that the difficulties do not diminish.

The Problem of Factory Lighting.

THE report for 1922 of the Chief Inspector of Factories and Workshops (Mr. Gerald Bellhouse) is full of useful and instructive information, though from our point of view, in respect of lighting and heating, there is not a great deal that is new. To what there is, we cannot on this occasion take exception. In some of the previous reports, statements have been found referring to lighting and heating that have not appealed to us as being altogether impartial, and in some respects they have not disclosed that degree of technical knowledge which is essential when one adopts the rôle of critic. But so far as the present report goes, there are indications that time is bringing to the inspectors a greater knowledge of the principles of lighting—the principles that claim that light for specific purposes should not be excessive or under the required amount, also that it should not be baleful to vision. These are highly important points in the lighting of factories and workshops, where so much—output, safety, and the sight of the workers—at certain seasons of the year, and after dusk at any time, depends on the efficiency of the lighting. Many manufacturers study the efficiency of their machinery, and do many other things which generally contribute to efficiency, but are negligent of the lighting. Its efficiency is one of the last things to be considered; yet it is of very considerable consequence in the industrial mechanism.

In the present report, it is declared that the question of lighting in industry has certainly not received in the past the attention it deserves; but a change has set in, though not so universally as is desirable, and not in some cases, where there has been improvement in the volume of illumination, with that consideration of scientific principles that is necessary. The inspectors find, however, that the importance of good lighting and its effects upon the health and safety of the workers is being realized, and that more consideration is now being given to suitable methods of lighting adapted to the varying nature of the work. This shows that ground is being gained. We should have been surprised if this were not so after the large amount of propaganda work that has been done, supplemented by the reports of the Departmental Committee on Lighting in Factories and Workshops; in fact, to the third report of this Committee is attributed a stimulation of interest in the subject among factory owners. The Chief Inspector gives the further interesting information that it is not only the owners of factories and workshops among whom interest in the subject is beginning to circulate; it is also penetrating among the representatives of the workers. At some of the meetings of Joint Industrial Councils, the recommendations contained in the third report of the Departmental Committee have been discussed. From the trend of the discussions, it is plain that the owners' representatives are largely agreed that not only in the interests of the workers, but in their own, the subject of lighting should receive more careful attention. Among the workers' representatives on the Joint Industrial Councils, there is not less appreciation of the importance of the subject; and the elements of what is necessary are being better understood by them. Once get the workers to regard lighting efficiency as a factor in safety, adding to the comfort of working conditions, and protecting their eyesight, and they will make this an item in their requirements, and will not rest until, where it is required, improvement is effected. It will be rather a singular spectacle if the workers have to exercise pressure to bring backward employers to toe the line in respect of lighting efficiency.

However, the manufacturers are not all backward; and among those who are not are some who are extravagant in their new lighting installations. These manufacturers almost deserve to be placed in the same category as those whose works or workrooms are equipped with insufficient light. The Chief Inspector remarks that some manufacturers spend considerable sums of money on their lighting installations, while others have done very little. Upon this there is the philosophical comment: "It is not so much a "matter of spending a large amount of money as of making "the best use of what is spent." And again: "Vast sums "of money are spent on installations and much money is "wasted on brilliant lighting little adapted to its particu-"lar work." Still further: "Many manufacturers could no "doubt reduce their lighting bills by half, and at the same "time have more satisfactory results." We have time and again drawn attention to this matter; and we are glad to see this official recognition of extravagant process in bringing about a doubtful reformation in the lighting equipment. Thousands of pounds have been wasted in this way; and, generally speaking, it has not been disinterested advice that has brought about the prodigality. New installations are made from beginning to end—sometimes by electricity displacing old-fashioned gas-lights; while by adopting modern incandescent gas-lamps, excellent lighting for all purposes could be secured, with a saving in gas consumption which would contribute very largely to the cost of modernization. The report instances extravagant and bad lighting—cases where lamps are installed without any thought being given to the result. One inspector mentions an installation of pendant electric-lamps stretching from end to end of the room. The actual illuminating result was very great; but it was impossible to find any point where the effect of glare could be avoided. Better effects, he says, could be obtained by using half the light with properly disposed lamps. In another—a silk—factory electric lights with unsuitable shades were first fitted; and the glare affected the sight of the girls. The lights were removed to the ceilings, and suitable shades and reflectors were provided. There has since been a marked improvement in the output. But these alterations cost money, and make work for the electricians. Several inspectors comment on the trying effects of glare, and upon the necessity for more attention being given to shading, especially since gasfilled lamps have become more generally used. There is a great deal of misconception as to the economy of these lamps. They are not economical in first cost; they consume more than half a watt per candle power; and by the time they are suitably dressed for the purpose of protecting the eyes of the workers, the useful lighting duty per unit of consumption has fallen, which means that the efficiency and cost are not those represented.

There are several points clear from this report. One is that there is a growth in appreciation of the importance of adequate lighting. Another is that the fight against inadequacy has not been finished; and, furthermore, it is plain that it is necessary simultaneously to wrestle with the disposition to go to the opposite extreme of unsuitable and harmful installation, at considerable expense, though probably carried out under "expert" advice.

National Gas Exhibition.

The preliminary list of exhibitors at the National Gas Exhibition to be held at Birmingham from Sept. 17 to Oct. 3 is published in our news columns to-day. With close upon eighty firms exhibiting, and others possibly coming in, a good display is guaranteed in all departments of work—particularly in respect of the applications of gas by the most modern types of apparatus. It is in this direction that the public will be chiefly attracted; but this exhibition is going to take to Birmingham gas engineers from a large area, who will be interested not only in those goods which will appeal to the public, but in those exhibits which will have

purely technical interest. The joint meeting of gas salesmen in Birmingham will also do a great deal to carry to all parts of the country impressions and information regarding the newest of gas appliances.

Sulphate of Ammonia Concession.

The farmers have good cause to thank the British Sulphate of Ammonia Federation, Ltd., for the consideration shown to them in respect of the price of the valuable fertilizer which they market. Our news columns show that the Federation have offered a special inducement to buyers to take early delivery this season, by making a rebate of 10s. on all orders for August delivery which reach them before Aug. 18. Those who have already placed orders have not been forgotten; and they too will receive the concession, by complying with the conditions laid down by the Federation. The effect of the arrangement will be to reduce the price for July-August delivery to £14 5s. per ton for neutral quality (25¾ p.ct. ammonia). The price for September will be £14 10s. for the same quality. There are limited quantities of ordinary quality (25¼ p.ct. ammonia) which will be sold at 23s. per ton less than the prices named above. The figures should be very tempting to buyers, having in view the costs of production.

Successful Candidates.

The lists of successful candidates in the City and Guilds of London Institute examinations in gas engineering, gas supply, and gas fitting are published in our columns to-day. These show that a considerable proportion of the candidates in each section, and in both the first and second classes, have passed. We congratulate them on their success; and we hope, when the examiners' reports are available, they will show that there is less cause for adverse criticism of the candidates' efforts than there has been in some previous years. If the preparation for these examinations has not been of that order which is now considered desirable in view of the circumstances and enlarged responsibility of the gas industry, the examinations themselves at all events show the existence among the aspirants to positions in the industry of a desire to possess good qualification. This applies not only to gas engineering, but also to gas distribution and utilization, as well as to fitting work.

Gas Prices and Sub-Tenants.

Some people who let apartments or have boarders profiteer hugely over the gas supplied to them. The high price to which gas ascended during and since the war has been an opportunity which they could not resist. The occupier of the house is charged for the gas measured by the main meter; and the apartments or bedrooms are, as a rule, furnished with gas by means of prepayment meters—the contents of the money-boxes being collected by the occupier. Though the price of gas has been considerably reduced, many meters through which sub-tenants pay for their gas have never been adjusted to a reasonable figure in relation to the current price. We do not know that gas companies or local authority gas committees can interfere in this matter, where the sub-meters are the property of the responsible occupier of the house. But certainly it would be a good thing if there was regulation of the amount of excess price for gas that can be charged to sub-tenants—say, 10 or 15 p.ct. upon the ordinary price of gas. "F.R.S." has written to the "Daily Telegraph" on this subject. He says that sub-tenants have frequently not received "any advantage from the various falls in the price of gas." In one case known to him, "the landlord has refused to remedy the matter, well knowing that the tenant concerned cannot find suitable accommodation elsewhere. In a poor district in Holborn, each occupier of rooms in a number of houses has a penny-in-the slot meter; the accumulated pennies being collected from time to time by the landlord. The price charged for gas is estimated to be about 50 p.ct. above the current prices charged by the Gas Company." He adds that apparently the gas companies are in no way to blame, and doubtless deprecate such methods. He asks: Is the practice in effect an evasion of the Rents Restriction Act?

Gas in Argentina.

The Primitiva Gas Company of Buenos Aires had a very rough time during the war and subsequently. The difficulties of keeping the gas supply going through want of suitable materials were then supplemented by the financial relations existing between the Company and the Municipality. But in all respects the position is better now; and the Chairman (Sir Albert E. Bowen, Bart.) is able to say that the corner has been turned. This is a more satisfactory feeling; but the losses of lighting to electricity during the years of serious hardship, it appears, are not likely to be retrieved, other than in a relatively small way. But electricity cannot compete with gas for cooking or any heating purpose; and the Company are making good headway in new business in these directions. Other gas concerns in South America have businesses composed almost wholly of this class of custom; and they have never done better than now. Meanwhile, the Company have productive capacity for about three times the trade they did last year. But optimism is returning, and this is a splendid factor in business.

Electricity at Wembley.

"Electrical Industries" has been taking to task a borough councillor who objected to a contribution of £58 being made to the British Electrical Development Association towards the expenses of a special electrical display at the British Empire Exhibition. Our contemporary discloses the aspirations of the Association in the matter of funds. They total to £50,000. It says: "Already a group of small private undertakings have put down £1000 towards the electrical display at Wembley; and large companies are contributing many thousands of pounds. Municipalities are showing the greatest interest in the project; and from all parts of the country their subscriptions are arriving. There is not the slightest doubt that the £50,000 aimed at will be obtained." It was not diplomatic to say this; as it may determine some of the waverers to keep their money in their own pockets. There are some people who have a decided preference for letting others pay for "co-operative" enterprise.

Lower Railway Rates for Coal, &c.

Several important railway companies have made the further concession for merchandise (including coal, coke, and patent fuel) from 60 p.ct. to 50 p.ct. above the rates in force on Jan. 14, 1920. But no alteration has been effected in the flat rate additions. Immediately the announcement was made, some people expressed satisfaction, and thought that the additional 10 p.ct. would be hailed with delight by the mining industry. But the mining industry, while welcoming every reduction, has not yet reached the goal of its desire. There is a hint that 33 p.ct. above pre-war figures is more in accord with views. The same day that the announcement was made as to the reduction of the percentage, the Mining Association issued a statement concerning another interview with the representatives of the railway companies. It is stated that facts and figures were put forward by the coalowners' spokesmen in support of the case for a substantial reduction. A report of the interview is being prepared for further consideration by the railway companies. Although no promise was obtained, it is anticipated that "the friendly pressure which the coalowners have for two years maintained will not be without effect."

The Miners' Wage Agreement.

The Mining Association and the Miners' Federation have had a conference regarding the application of the latter for a revision of the national wage agreement. The desired terms of revision emanated from the recent annual conference of the Federation at Folkestone. Three points have been put forward: The first is a modification of the percentages in which the income of the industry, after meeting all other charges, is divided between the workmen in wages and the colliery owners in profits, to give a higher percentage in wages. The second is the raising of the fixed minimum wage to an amount equivalent to the increase in the cost of living, which would mean 70 p.ct. on the 1914 wage. The third is fuller particulars of the other costs of production, included in the monthly ascertainments, upon which wages and profits are determined. There seems to have been a friendly and extended discussion of these matters; but as the Chairman of the Mining Association (Mr. Evan Williams) pointed out, questions of vital importance are involved in the proposals, to which the Association cannot reply until they have been considered by the general body of coalowners, and the opinions of the District Associations have been ascertained. When this has been done, there will be a further meeting.

Industrial Accidents.

The report of the Chief Inspector of Factories and Workshops tells us that there were, during 1922, 97,986 accidents in factories and workshops, and of these 843 were fatal. The total number of accidents is an increase of 5421 over the year 1921; but in that year the figures were affected by the miners' stoppage. It is clear that coal gas contributed very little to the total number of accidents; and producer and suction gases, high as are their percentages of carbon monoxide, did not do much to raise either the total of accidents or the number of fatalities. There were 37 accidents in which producer or suction gas had part; and seven deaths resulted. With coal gas, there were 32 accidents (including only one fatality). Four of the accidents occurred in gas-works; the remaining 28 in workrooms through defective fittings and inadequately ventilated stoves. This shows that periodical qualified inspection would be a good thing. But turning to electricity, for number of accidents and fatalities it beats gas hollow. It was accountable during the year for 309 accidents in industrial establishments, of which seventeen were fatal. These figures compare with 322 accidents and 12 fatalities in 1921. A tabulated statement referring to the electrical accidents last year states that the "probable voltage of shock" in twelve of the seventeen cases of fatality occurred at 250 volts and below—one as low as 127.

PERSONAL.

The Blackpool Borough Council have confirmed the appointment of Mr. DOUGLAS FORBES IRVING, Assoc.M.Inst.C.E., as Assistant Gas Engineer and Manager. Mr. Irving was educated at Bristol Grammar School and the University, and was articled to his father, Mr. D. Irving, M.Inst.C.E., then Chief Engineer to the Bristol Gas Company. He qualified (by examination) and was duly elected an associate member of the Institution of Civil Engineers. Mr. Irving was then appointed an Assistant Engineer of the Bournemouth Gas and Water Company, under Lt.-Col. H. W. Woodall, C.I.E., M.Inst.C.E., and served them for over three years. He was afterwards appointed Resident Engineer to the Woodall-Duckham Vertical Retort Company, serving for two years under Sir Arthur Duckham, K.C.B., M.Inst.C.E. On the outbreak of war in 1914, Mr. Irving obtained a Commission in His Majesty's Forces, and served in India and Burma. In 1919 he was selected by the Indian Munitions Board as Assistant Engineer at the Calcutta ordnance factories. His wife being unable to stand the climate, he was obliged to resign his position, returning to England at the end of 1920, when he was demobilized. Early in 1921 he was appointed Shift Engineer at the East Greenwich works of the South Metropolitan Gas Company.

The Directors of the Aldershot Gas, Water, and District Lighting Company have appointed as Assistant Chemist Mr. PHILIP WEDGWOOD, B.Sc., of Flimby, Cumberland. The vacancy was recently advertised in the "JOURNAL."

At the recent City and Guilds of London Institute Technological Examinations, Mr. JOHN GRAYSTON, a pupil at the Colne Gas-Works, secured, in gas engineering (final), a first-class pass, with a first prize valued £5 5s., and has been awarded the silver medal. In addition, he passed first-class in the final examination in gas supply. Also, under the Union of Lancashire and Cheshire Institutes, taking the chemical trades course (senior), third year, he has passed first in order of merit for the Duckworth prize, value £2 2s., with three first-class passes in inorganic, organic, and physical chemistry. Last year, in the junior examination in gas engineering, he was awarded the bronze medal. Mr. Grayston, a son of Mr. T. Grayston of the Colne Education Department, took his lectures at the Burnley Municipal College.

OBITUARY.

We greatly regret to learn of the death last Thursday night of Mr. JOSEPH DAVIS, Engineer and Manager to the Gravesend and Milton Gas Company; and on Sunday, at Lewisham Hill, of Mr. SAMUEL CUTLER, SEN. Further reference to the sad events will be made next week. Mr. Cutler is to be interred in Charlton Cemetery next Friday (Aug. 10)—funeral service at Blackheath Congregational Church (adjacent Blackheath Station), at 2 p.m.

The death occurred on Tuesday of last week of Mr. JOHN HOLDEN, of Blackburn, one of the best-known officials of the Corporation. In early life, deceased was at the Church Gas-Works. Afterwards he became Manager of the Brecon Gas-Works, and later occupied a similar position at Glossop. Believing there were better prospects in Blackburn, he settled down in the town, and again started at the bottom of the ladder. He quickly rose to the position of superintendent of the distribution department at Jubilee Street. Later, he was transferred to the Addison Street Gas-Works as superintendent, a position he held until the time of his death.

ELECTRICITY SUPPLY MEMORANDA.

THE Electricity Commissioners, with the best of intentions animating them, are not exempt from the failing of straying from the path of legal virtue. That, at all events, is the view which one is permitted to take, if the decision of the Court of Appeal in respect of the Commissioners' scheme for Greater London is not upset by an appeal to the House of Lords. We do not know that this step will be taken; but, whether it is or not, the present position is that Lords Justices Bankes, Atkins, and Younger are unanimously of the opinion that the Electricity (Supply) Act, 1919, is quite plain in respect of the powers it confers, and that there is not the elasticity in them that the Commissioners imagined. In one respect, we are sorry for the Commissioners; in other respects—particularly as the gas industry is an enormous rate-paying participant in the area affected by the Commissioners' plans—there is a natural satisfaction that the scheme has been pronounced *ultra vires* the provisions of the Act. We have sympathy for the Commissioners in that the London electricity supply problem is one of the most complicated puzzles they have had to face. We believe they made a perfectly honest attempt to find a solution; but that solution apparently did not please many people. As a matter of fact, there were substantial objections to it—though certain journalists, when the scheme first appeared, wrote about it as though the Commissioners could do no wrong. Of course, they are not infallible; and, in this instance, the Court of Appeal have told them that they erred in exceeding the powers with which Parliament invested them. If the case goes to the House of Lords, this conclusion may be reversed; but really we cannot see how it can be.

The Commissioners' Mistake.

Points at Issue.

It will be remembered that the Commissioners' scheme provided for the appointment of a Joint Electricity Authority and two Committees—one representing local authorities owning electricity works, and the other the electricity supply companies. To these committees it was proposed should be delegated certain of the powers of the Joint Electricity Authority; and the Commissioners contemplated investing them with a very fair share of independence. The chief objection, as stated by Lord Justice Bankes, was that the Commissioners were travelling outside their parliamentary powers, and acting without jurisdiction, in putting forward the scheme in its present form. In the opinion of the Court, what has been done was not authorized by the Act. But in the view of Lord Justice Bankes, while the Commissioners have a statutory right to determine whether the power of delegation should be conferred upon a Joint Electricity Authority, the statutory right of exercising that power is vested in the Joint Electricity Authority, and in them alone. An important part of the case had reference to the right of the Court of Appeal to make any Order as to either prohibition or certiorari. It was contended that the proceedings in reference to the preparation of schemes were controllable by Parliament alone, and that at no time could the Court intervene, whether or not the proceedings were *ultra vires*. The result of this would be that any application for a writ of prohibition would be either premature or too late. In effect, the acceptance of this argument would mean that the subject would no longer have a right, in cases like the present one, to go to a Court of Law, and demand an inquiry as to whether or not a decision of which he complained was *ultra vires*. Lord Justice Bankes asked why Parliament should object to the Court of Appeal being compelled to exercise its powers to keep the Commissioners within the limits of their authority. Parliament provided that no Order of the Commissioners should have effect until approved. This, in the view of the Court, does not exclude the jurisdiction of a Court of Law. It has always been the boast of our Common Law that the Courts would, whenever possible and necessary, apply existing principles to new circumstances. The Court, in fact, found abundant precedent for taking action in the present stage of the proceedings of the Commissioners. The appeal as to prohibition succeeded, and was allowed with costs; and the appeal from the order refusing to make absolute the order for a writ of certiorari was dismissed with costs.

Sir John Snell's Confession.

The South-East Lancashire Advisory Board have been celebrating, by a luncheon in Manchester, their first statutory meeting. At this luncheon, Sir John Snell was present, and replied to the toast of "The Electricity Commissioners." What he said excites one's best sympathy for that body of estimable gentlemen, who are trying to do their best in circumstances containing resistances to smooth and peaceful progress of an order vastly exceeding any prior expectation. Sir John said flatly and firmly that, had he known what was before him when he was asked by the Government to take up the position of Chairman of the Commissioners, he would have refused the proposal. He has been astonished, considering the comparative youth of the industry, by the complexity and difficulty of the matters with which the Commissioners have to deal. He told his hearers something that they already knew only too well. It is no easy thing to provide machinery which will meet the views of the

various authorities, extending over a large district, and reconcile their rights and obligations in such a way as to secure a sound working organization. There was also allusion to the complications and troubles which are the lot of the unfortunate Commissioners dealing with the London problem. Then there is the pressure that is brought to bear upon them in connection with the granting of loans. Apparently each authority wanting a loan thinks its application is the one and only matter with which the Commissioners have to deal. Sir John asked the impatient ones to remember what the Commissioners have to do. In three years they have dealt with 1500 applications for loans. And all the details of each scheme undergo careful scrutiny. The information from Sir John's lips confirms what one has gathered by observation. The Commissioners have done wonders; but the goal of it all, as fantastically pictured before they came into being, appears as far off as ever. How near are we to those miracles that were going to save the country millions of tons of coal a year, and supply electricity to every cottage at a price that would give the labourer his lighting, cooking, and heating by electricity? Ridiculous as were the statements in those days, time has induced more and more men to smile over the predictions of the dreamers.

High Charges, Dividends, and Reserves.

In the case of gas companies, charges to consumers and dividends to share or stock holders are regulated by Act of Parliament, as are reserves. But the electricity supply companies appear to have a liberty in these respects that is inconsistent with the precedents created by Parliament in regard to gas supply. The London County Council have had before them a report by the Highways Committee which shows that the latter have been reviewing the position of certain companies in relation to the charge to the consumers. There is the Notting Hill Electricity Supply Company, who since Jan. 1 have been charging 7d. per unit for lighting, 2½d. for power, and 3d. for heating. Apparently they do not care much for a heating load. They are doing very well without it—better than some concerns that have been enthusiastically trying to develop this use of electricity, which can only be of a very spasmodic order owing to the cost for continuous operation. The Notting Hill Company appear to have big appetites for dividends. In 1921, they were in a position to pay 16·58 p.ct.; and in 1922, they distributed 18·57 p.ct.—representing a charge to the consumer of 1½d. per unit. The dividend is regarded by the Committee as excessive. The Company's average revenue per unit for all purposes in 1921 was 6·6d., of which 2·03d., or 31 p.ct., represented the charge for dividends and interest. The Committee have also been probing into the question of charges by the County of London Electric Supply Company. For domestic lighting they charge 5½d., and for business premises 5d., with an obfuscating *plus* in both cases of 50 p.ct., or the maximum prices where these are less than the above figures. The maximum price in the greater part of London is 8d., and in part of Holborn and in certain extra-London areas 7d. per unit. Under this arrangement, the charge made for domestic lighting is in most cases the maximum allowed—viz., 8d. per unit. The power charges are on a sliding-scale, according to consumption. The highest charge is 2½d. *plus* 60 p.ct., or equivalent to 4d. per unit. Discounts are given in respect of power supplies. But for heating, the charge is 1½d. *plus* 60 p.ct., which is equivalent to 2·4d. per unit. The highest prices charged by the London Companies for current are as follows: Brompton and Kensington, 7d.; Charing Cross, 8d.; Chelsea, 7½d.; City of London, 8d.; County of London, 8d.; Kensington and Knightsbridge, 6d.; London, 8d.; Metropolitan, 7d.; Notting Hill, 7d.; St. James' and Pall Mall, 6¾d.; South London, 6d.; South Metropolitan, 8d.; Westminster, 6½d. It will be seen that the highest price (which is that in respect of domestic consumption) charged by the County of London Company is not exceeded by the corresponding price charged by any other London Company. At the same time, the Committee think it right to point out that the average price per unit charged by the Company for all supplies was, according to the figures for 1921 (the latest available), one of the lowest in London; but this included bulk supplies. The Company paid 10 p.ct. dividend last year, or 2 p.ct. more than in 1921. But the dividend was less than that paid by eight other London Companies. The Company, however, have been doing something else with the money. Last year they put to general reserve £242,500—making it £450,000, or equivalent to 27 p.ct. of the ordinary and preference capital. Reserve for depreciation was increased by £34,537—making it £310,035, or equivalent to 10½ p.ct. of the net capital expenditure. The balance carried forward to net revenue account was increased by £26,431 to £48,218. The Committee consider that in this case the sums transferred to reserve are excessive; those placed to general reserve being equivalent to no less than 1d. per unit. Both Companies are to be interrogated as to their intentions in respect of a further reduction of price.

Electric Geysers.

For a time we suppose there will be a run on the designing of new types of electric geysers. One form was noticed last week; another is brought to our attention through a description in the "Electrical Review." This is known as the Santon geyser; and our contemporary says it is the one known "to give the greatest efficiency obtainable—being almost 100 p.ct." The makers of the geysers will be pleased to read this. There are gas-geysers the efficiency of which we will not say is 100 p.ct.; but it is very high. Besides, one has rather more heating value in 7 c.ft. of 500 B.Th.U. gas than in a unit of electricity. It is stated that the leakage of current to earth has been overcome in this geyser by providing a body of insulating material containing channels through which the water passes, forcing the water to take a path of comparatively great length and small sectional area. The householders who have this geyser brought to their notice will be interested to learn that "these channels being interposed between the actual resistance element and the earthed parts offer a very high ohmic resistance—thus making it a suitable apparatus for connection to any electricity supply system." Then we read that the geyser has a very attractive appearance; being made of black insulating material, having an aluminium spout, which is provided at the back of the apparatus with a terminal for connection to earth. When so connected, there is not the slightest possibility of shock. Another point which will give satisfaction to householders who are tempted to use the geyser is that, "in the event of the earth wire being carelessly left off, only a very slight shock is felt, owing to the water channel resistance." Something more explicit than the next statement is desirable. The design, it is said, gives a very long life to the heating element by rendering electrolysis practically non-existent. The scale which forms on the element obligingly removes itself. When the coating of scale is complete, it cracks off, and is easily washed away. While the scale is there, is the efficiency still 100 p.ct., or is the time required to do the work extended? New elements, it is stated, can be fixed in three minutes. Several advantages are claimed for the ability to change the rubber inlet-pipe from the hot to the cold tap, one of which advantages is that the water in the storage tank can be boosted up for a bath. This is said to minimize considerably the consumption of current. We have not seen anything in the way of an electric geyser which can beat the gas-geyser in economy of both money and time.

An Error in Arithmetic.

Shaldon is near Teignmouth; and the inhabitants have been discussing the question of adopting gas or electricity for street lighting and other purposes. At a public meeting, Dr. A. G. Holman made the statement that he was in favour of gas, as he found it cost him about 2s. 6d. to boil half-a-pint of water by an electric hotplate. Although partizans of gas, we think the Doctor must have been mistaken or misreported, unless, of course, he was using a heating element damaged by use and the spilling of liquids upon it, or a heating utensil that had not a beautifully level bottom, making perfect contact with the heating element in all parts. When kettle and element are both new, the Doctor ought to realize 40 to 45 p.ct. efficiency. The "Electrical Times" corrects the Doctor, and makes an error itself. It says that to raise half-a-pint of water from 58° Fahr. initial temperature to 212° Fahr. would require only 96¼ B.Th.U. This 96¼ B.Th.U. is at 100 p.ct. efficiency; but later on an efficiency of 50 p.ct. is referred to. At 50 p.ct. efficiency, the 96¼ B.Th.U. should be doubled. But 50 p.ct. efficiency! And an inlet temperature of water of 58° Fahr.! This is England where water is very seldom drawn from mains at 58° Fahr. If it was always at that initial temperature, it might almost be used for the low-temperature heating of rooms.

Electricity Thefts.

People who are economically inclined are finding ways and means of getting electricity for nothing. The gas industry had a long experience of this sort of thing. It was quite a flourishing scheme at one time to obtain gas without paying for it, by the simple expedient of arranging a by-pass from the inlet to the outlet side of the meter. But a long series of punishments of various kinds did something to abate this form of misdemeanour. We see that five men were recently summoned for fraudulently extracting electricity from the mains of the Newcastle-on-Tyne Electricity Supply Company. The prosecuting solicitor told the Court that the Company had been aware for some time past that there was a considerable leakage in the Newburn district. The method by which the current was taken was the simple one of inserting a pin in the ingoing cable to the meter, and another into the cable beyond the meter—the two being connected by a length of insulated copper wire; so that the current was taken without passing through the meter. Fines of £3 each were imposed, or a month's imprisonment in default. At the Neath Police Court, a man was fined £2 for a similar offence.

Manchester and District Junior Gas Association.—Some alteration has been made in the arrangements for next Saturday's visit to the Great Harwood works of the Accrington Gas and Water Board. Mr. H. B. Knowles will not read a paper, as previously announced; but Mr. Walter Hole (representing the Institution of Gas Engineers) will be present to explain the Education Scheme.

Synthetic Grey Iron.—Carburization tests to determine the feasibility of making synthetic grey iron in an indirect-arc rocking-type electric furnace have been made at Detroit by engineers of the United States Bureau of Mines. The results are said to have been very gratifying, an excellent quality of grey cast iron being produced in every test. On the evidence of these tests, an inspector for one of the large automobile plants in Detroit placed a large order for castings, specifying electric furnace iron, and agreeing to pay a premium therefor.

CITY AND GUILDS OF LONDON EXAMINATIONS.

List of Successful Candidates in Gas Engineering, Gas Supply, and Gas Fitting.

The pass-lists for the recent examinations in Gas Engineering, Gas Supply, and Gas Fitting have been sent by the Department of Technology of the City and Guilds of London Institute to the Institution of Gas Engineers; and they have been forwarded to us for publication by Mr. W. T. Dunn, the Secretary. The questions set in the different examinations will be found in the "Journal" for May 9 (p. 362) and July 11 (p. 270).

GAS ENGINEERING—FINAL.

First Class.

Candidate's Name.	Examination Centre.
Abbott, John G.	Polytechnic, Regent Street, London
Banham, Percy	Norwich
Barrow, Walter C.	Liverpool
Bellamy, Bernard	Plymouth
Bennett, Stanley R.	Burnley
Bradley, Morris P.	Halifax
Branson, William R.	West Hartlepool
Bull, Frank H. C.	Bristol
Casseldine, Gerald E.	Polytechnic, Regent Street, London
Corrigan, John.	Carlisle
Dobson, Wilfred A.	Stockton-on-Tees
Gibbons, Eric B.	Polytechnic, Regent Street, London
Grayston, John	Burnley
Hudson, Norman	Leeds Technical School
Lee, Albert S.	Polytechnic, Regent Street, London
Lockey, Dennis W.	Spennymoor
McBain, James	Burnley
Nicholson, Maurice Roy	Portsmouth
Pilbeam, Charles J.	Tunbridge Wells
Preston, Joe B.	Bradford
Riley, James	Burnley
Robinshaw, James	Manchester
Robinson, Harry D.	Burnley
Shorrock, James N.	Birmingham
Smith, Herbert	Birmingham
Wadsworth, Frederick J.	Bradford
Wood, Charles C.	Wellingborough

Second Class.

Baines, John C.	Polytechnic, Regent Street, London
Bell, Arthur	Dept. of Applied Science, Sheffield
Bell, James	Stirling
Birch, Ernest	Stockton-on-Tees
Bointon, Ernest	Scarborough
Bradfield, Keith	Polytechnic, Regent Street, London
Braidwood, Geoffrey L.	Polytechnic, Regent Street, London
Brown, John J.	Liverpool
Butcher, Albert E.	Polytechnic, Regent Street, London
Challinor, Alfred T.	Burslem
Chantler, Richard A.	Liverpool
Church, Arthur	Polytechnic, Regent Street, London
Colebourn, Sydney	Reading
Cuttle, Harold	Manchester
Dalton, Charles W.	Dundee
Daniels, John H.	Liverpool
Dunbar, William L.	Glasgow
Ellis, George W.	Polytechnic, Regent Street, London
Fiddes, George E. A.	Leicester
Fry, Percival G.	Polytechnic, Regent Street, London
Gavin, Robert J.	Edinburgh
Gee, Francis H.	Manchester
Godwin, Claude V.	Polytechnic, Regent Street, London
Goodwin, Frank	Brighton
Grimwood, Charles E.	Ipswich
Henwood, John V. T.	Polytechnic, Regent Street, London
Hill, Frank	Birmingham
Hinchliffe, Jack	Huddersfield
Hodnette, William G.	Birmingham
Howard, Francis W.	Polytechnic, Regent Street, London
Jamieson, Alexander	Glasgow
Keillor, Ronald D.	Glasgow
King, Alexander D.	Glasgow
Knight, Leonard	Polytechnic, Regent Street, London
Le Jeune, Edward C.	L.C.C. Paddington Tech. Inst.
Lee, Leonard	Plymouth
Levisohn, James F.	Burslem
Lewis, William E.	Polytechnic, Regent Street, London
Lister, Horace	Bradford
McLusky, James McR.	Keighley
Martin, Arthur R.	Polytechnic, Regent Street, London
Newsome, Vincent L.	Manchester
Nichols, James A.	Polytechnic, Regent Street, London
Noble, William H.	Technical College, East Ham
Ogden, George	Blackburn
Ogden, John	Manchester
Quiller, Wilfrid R.	Plymouth
Roberts, John	Bradford
Roberts, Percy	Manchester
Salmon, Edmund G.	Tunbridge Wells
Saunders, Alfred G.	Liverpool
Scobie, John	Edinburgh
Sinclair, Arthur T.	Glasgow
Smalley, Arthur	Leeds Technical School
Tatham, Frank C.	Leeds University
Walker, Maurice.	Polytechnic, Regent Street, London
Ward, Denis J.	Birmingham
Willmott, Norman G.	Polytechnic, Regent Street, London
Woosnam, William A.	Liverpool

GAS SUPPLY—FINAL.

First Class.

Candidate's Name.	Examination Centre.
Aulton, Eustace J.	Birmingham
Beaumont, Frank	Huddersfield
Benbow, Ernest W.	Smethwick
Bennett, Stanley R.	Burnley
Bointon, Walter	Scarborough
Bowcutt, Lawrence R.	Bradford
Bujnowski, Alexander	Glasgow
Caton, Herbert F.	East Ham
Church, Ernest H.	Erith
Corrigan, John.	Carlisle
Craven, Kenneth F.	Leeds
Dare, Horace G.	L.C.C. Westminster Tech. Inst.
Dunn, Lewis A. J.	" " "
Edridge, George M.	" " "
Franklin, Charles.	Exeter
Grayston, John.	Burnley
Hilbam, Reginald W.	Great Yarmouth
Hill, Leonard Charles	Bournemouth
Holloway, Leonard R. C.	Goldsmith's College
Hough, Arthur L.	East Ham
Johnson, James R.	L.C.C. Westminster Tech. Inst.
King, Alexander Duncan	Glasgow
Langstreth, Gilbert	Burnley
Millard, Frederick H.	L.C.C. Westminster Tech. Inst.
Mothersole, George	" " "
Musgrove, Horace Sherry	Bournemouth
Newton, William Thomas	Hereford
Nicholson, Maurice R.	Portsmouth
Rawnsley, William E.	Leeds
Rioch, John Hunter	Inverness
Robinshaw, James	Manchester
Robinson, Harry D.	Burnley
Russell, William	Glasgow
Smith, Joseph Frank.	Birmingham
Smith, Philip C.	L.C.C. Westminster Tech. Inst.
Sutton, Wilfrid L.	" " "
Taylor, Bertram W.	Birmingham
Topp, James Ballantyne	Edinburgh
Tyrell, Albert E.	L.C.C. Westminster Tech. Inst.
Wells, Bertram Neale	Margate
Whitehorn, Ernest W.	L.C.C. Westminster Tech. Inst.
Williams, Rowland J.	Cardiff
Yule, David	Edinburgh

Second Class.

Anderson, Thomas W.	L.C.C. Westminster Tech. Inst.
Ansell, William E.	" " "
Baxter, William D.	Goldsmiths' College
Bishop, Charles Thomas	Birmingham
Broadbridge, Harold G.	"
Brown, James Tod	"
Burnell, Albert E.	L.C.C. Westminster Tech. Inst.
Chadwick, John	Manchester
Challinor, Alfred T.	Burslem, Stoke-on-Trent
Chalk, Walter A.	L.C.C. Westminster Tech. Inst.
Corbin, Arthur C. S.	Exeter
Ford, Edmund	L.C.C. Westminster Tech. Inst.
Gardner, Sidney A.	Birmingham
Goldsmith, James H.	Croydon
Harris, Cecil C.	L.C.C. Westminster Tech. Inst.
Harris, Norman A. T.	" " "
Harwood, John	Bradford
Hickman, William J. S.	L.C.C. Westminster Tech. Inst.
Hobdell, John G.	" " "
Jones, Arthur A.	" " "
Jones, Frederick John	" " "
Keillor, Ronald D.	Glasgow
Lloyd, Leonard L.	L.C.C. Westminster Tech. Inst.
Marshall, Cyril C. B.	" " "
Mason, Arthur C.	East Ham
Nelson, William	"
Ogden, George	Blackburn
Ordish, John William	Birmingham
Parrett, Jack	Exeter
Pickett, Edgar	L.C.C. Westminster Tech. Inst.
Rush, Albert Edward	Ipswich
Sanders, Charles J.	Goldsmiths' College
Seaward, Sidney A.	L.C.C. Westminster Tech. Inst.
Sinclair, Arthur T.	Glasgow
Smith, William N. H.	Darwen
Standage, William G. E.	L.C.C. Westminster Tech. Inst.
Suckling, John R.	" " "
Tripp, Alfred James	" " "
Truscott, Charles F.	" " "
Turner, Francis Edwin	" " "
Turner, Leonard C.	" " "
Tutt, George Thomas	" " "
Ware, Arthur H.	" " "
Waterman, William S.	Bournemouth

GAS FITTING—FINAL.

Candidate's Name.	Examination Centre.	Class.
Benbow, Ernest W.	Smethwick	1
Bentley, Sidney V.	Acton & Chiswick Polytechnic	1
Bradley, William	Smethwick	1
Brazier, Alfred W.	Birmingham	1
Bullock, Thomas H.	"	1
Cashmore, Charles L.	"	1
Cooper, George	Salford	1
Cooper, William P.	L.C.C. Westminster Tech. Inst.	1
Cozens, Alfred A.	" " "	1
Davies, Arthur	Birmingham	1
Doley, Henry	"	2
Duffield, Oliver	"	1
Govey, Albert	L.C.C. Westminster Tech. Inst.	1
Hadley, Frank	Birmingham	1
Humphries, George	Smethwick	1
Jarrett, John M.	Birmingham	1
Kay, Thomas	Salford	1
Latham, Alfred	Birmingham	1
Lloyd, Frank H.	"	2
Knight, Ernest A.	"	1
Neale, John Frederick	"	2
Partridge, Albert J.	Smethwick	1
Pennington, Jesse F.	Birmingham	1
Price, Gilbert J.	"	1
Randall, Joseph	"	2
Rolfe, George H.	Smethwick	1
Sorge, Charles	Birmingham	2
Stokes, John S.	Smethwick	2
Tozer, William	"	2
Varrall, Clifton L.	Rochester	1
Wardle, Frank	Smethwick	1
Wiles, Hubert	Polytechnic, Regent St., London	1
Windmill, James D.	Birmingham	1
Woodhall, Albert	Smethwick	2

TESTING REFRACTORY MATERIALS UNDER LOAD.

Description of a New Apparatus.

A new apparatus has been designed by Messrs. Trost Brothers, of No. 26, Little Park Street, Coventry, to embody all available experience on the testing of refractory materials under load at high temperatures. Not only does it allow the softening point of refractory materials under load to be ascertained, but also, by means of an automatic mechanism, graphically records the thermal expansion before the softening point is reached, and the subsequent contraction or compression.

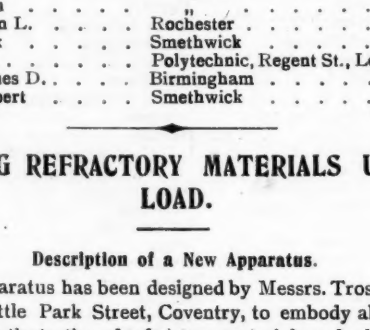


Fig. 1.—Apparatus for Determination of the Softening Temperature of Firebrick under Load.

The apparatus (fig. 1) consists of an electric carbon resistance furnace 14 and a lever press. The furnace is designed for a voltage of 100 to 120, and consumes about 12 kilowatts up to a temperature of 1600° C. It is vertical, and has an internal diameter of about 100 mm. An anvil of hard electrode carbon, about 300 mm. long and 60 mm. in diameter, projects into the bottom of the furnace. The test piece, which is cut out (by means of a hollow diamond drill) of a standard-size brick of the material to be tested, is placed on the anvil, and has a diameter of 50 mm. and a height of 50 mm. Cubes can also be used, sawn out of finished bricks and having the two ends ground smooth. When new refractories are the subject of research, the test pieces are conveniently prepared by pressing the substance into a steel mould and then firing. The upper carbon anvil or ram (480 mm. in length and 60 mm. in diameter) is loaded. This is accomplished by means of the lever 1, which has its fulcrum at 2, and at the other end is forked and carries the two hinge pins 3. These pins press on the bearings of the plate 5, which hangs on the lever, from which it can readily be detached. The plate 5 rests on the carbon ram 6. The load is varied by altering the weight in the scale pan 12, which is hung from the lever 1 at point 4. The weights can be varied between 20 and 40 kilogrammes, which, on an area of 20 sq. cm., corresponds to a load of 1 to 2 kilogrammes per sq. cm. The plate 5 can be lifted from the ram 6 by means of the releasing gear 7, which is worked by the lever 8.

The movement of the lever 1 caused by the expansion and softening of the test piece is barely perceptible to the eye. To make the movement plainly visible, it is magnified tenfold to twentyfold by means of the rod 9 and the pointer 10, which is a metre long. By securing a stylus to the pointer 10, a curve is drawn on a recording drum 11 showing the expansion of the test piece and of the two carbon rods with uniformly increasing temperature. Fig. 2 shows a number of such curves relating to well-known refractories. The horizontal axis is marked with a scale of time corresponding to the speed of rotation of the drum. All the curves were obtained with a uniform temperature rise of about 20° C. per 5 min. Thus a temperature scale is shown beneath the time scale, corresponding to the latter. The vertical axis measures the expansion and contraction of the test piece in the furnace, *plus* the expansion of the portion of the carbon ram which projects into the latter. The rising portion of the curves cor-

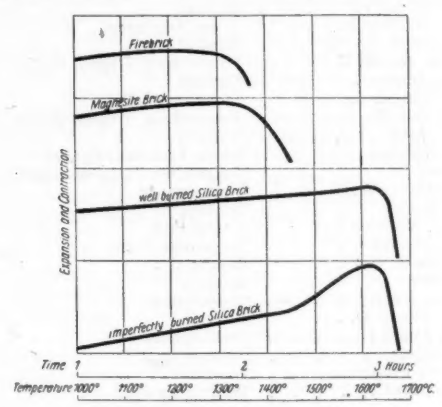

Firebrick
Magnesite Brick
well burned Silica Brick
imperfectly burned Silica Brick
Expansion and Contraction
Time 1 2 3 Hours
Temperature 1000° 1100° 1200° 1300° 1400° 1500° 1600° 1700°C.

Fig. 2.—Typical Softening Curves of Firebrick, Magnesite Brick, and Silica Brick automatically recorded with the New Apparatus.

responds to the period of rising temperature and expansion before softening. The moment the softening point is reached, the curve first becomes horizontal and then deflects rapidly downwards. Different types of refractory materials exhibit characteristic curves. Under a load of 1 kilogramme per sq. cm., firebricks begin to soften between 1200° and 1300° C.; the compression which takes place with a further increase in temperature being slow. The curve for magnesite bricks is similar, with the exception that the softening point is higher—1350° to 1400° C. The two lower curves represent respectively a high-quality well-burned silica brick with a true sp. gr. of 2·34, and an imperfectly burned silica brick with a true sp. gr. of 2·51.

For the purpose of measuring the temperature of the test piece the upper carbon ram 6 is provided with an axial hole 20 mm. in diameter. The centre of the upper surface of the test piece can be observed through this hole; and the temperature is measured by means of a Holborn-Kurlbaum, or Wanner, optical pyrometer. In order to protect the pyrometer from the radiant heat of the furnace, the rays are diverted at right-angles by means of the totally reflecting prism 15. Up to about 1400° C. the temperature can be measured accurately through the hole in the upper carbon ram; but above this temperature vapours are formed which disturb the path of the rays and cause the temperature to appear too low. In order to obviate this difficulty, a dense refractory tube (pyrometer tube), the lower end of which is sealed, is inserted into the hole in the carbon ram, and the inner surface of the bottom of the pyrometer tube is observed with the pyrometer. The temperature may also be measured by means of a thermo-couple.

The whole apparatus is mounted in an angle-iron framework. It is fitted with two rollers to enable it to be wheeled into position in front of the electric furnace; and four raising screws in the feet enable it to rest firmly in position.

Synthetic Ammonia from Coke-Oven Gas.—Referring to the proposals of M. Claude for applying his method of ammonia synthesis to the treatment of coke-oven gases, the "Iron and Coal Trades Review" says the fact that the gases are compressed for the purpose of recovering the hydrogen from them may be of advantage in carrying-out the whole process of debenzolizing under pressure. The yield in benzole would then be increased by 10 to 15 p.ct., while the size of the absorption and distillation appliances would be reduced. Naturally, the amount of solvents or scrubbing oil, the unavoidable losses and the consumption of steam, &c., would also diminish. As the various component parts of the gases are recovered and can be used separately, it is likely that from 150 to 200 kg. of ethyl alcohol will be produced per 1000 kg. of ammonia. The increase in the yield of benzole and the production of ethylene are alone sufficient to make up for the cost of compressing the gases, in view of the hydrogen separation.

GASEOUS COMBUSTION AT HIGH PRESSURES: NEW EXPERIMENTS.

By WILLIAM A. BONE, D.Sc., Ph.D., F.R.S., Professor of Chemical Technology at the Imperial College of Science and Technology, London.

[A Friday Evening Discourse given before the Royal Institution of Great Britain on May 11—Sir Arthur Keith, M.D., LL.D., F.R.S., Secretary and Vice-President, in the chair.

(Concluded from p. 416.)

EXPERIMENTS WITH ISOTHERMIC MIXTURES $2CO + O_2 + n\,R$ (WHERE $n = 0, 2, 4,$ OR 6, AND R = AR, CO, O_2, OR N_2).

Let us now pass on to consider (1) the behaviour of an *undiluted* mixture of carbon monoxide and oxygen in their combining proportions ($2CO + O_2$) on explosion in the bomb at a pressure (21·4 atmospheres) such that the total energy liberated would be nearly the same as in all the other experiments so far referred to, and (2) the effect of adding thereto successive molecular proportions (2, 3, 4, and 6) of one or other of the four diluents R (*i.e.*, Ar, CO, O_2, and N_2).

The pressure-time records obtained when the undiluted $2CO + O_2$ mixture was exploded at the said initial pressure are shown in fig. 10, from which it will be seen that the maximum pressure (245 atmospheres) was developed in 0·005 sec., after which the cooling period immediately set in; the pressure fall during the next 0·5 sec. being 66 atmospheres, or about 27 p.c. of the maximum. It is evident that an exceedingly high temperature was momentarily attained in this experiment. Indeed, assuming that the "chemical contraction" involved in the passage from $2CO + O_2$ (3 vols.) to $2CO_2$ (2 vols.) was substantially completed at the instant of maximum pressure, the temperature at that instant would have been of the order of 5000° C. In any case the experiment finally disposes of the supposition that carbon monoxide is inherently a "slow-burning" gas. Moreover, the whole character of the pressure-time curve seems inconsistent with the idea, which has sometimes been put forward, that the maximum pressure attained on explosion is materially affected by the dissociation of carbon dioxide. Indeed, there was no sign of any "after-burning" or heat evolution after P_m had been attained.

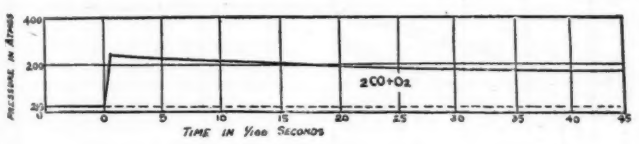


FIG. 10.

The effect of diluting the theoretical mixture $2CO + O_2$ with successive molecular proportions of "R" may be judged from Table II., which is almost self-explanatory. The following features are, however, perhaps the most noteworthy.

When $n = 2$. There was no perceptible retardation in the rate of attainment of maximum pressure so long as either carbon monoxide or oxygen was the diluent, from which it may be inferred that their purely "diluent" effects were just counterbalanced by their opposite "chemical mass" effects. Dilution with argon increased t_m from 0·005 to 0·010 sec., which may be considered as a purely diluent effect, whereas in the corresponding experiment with nitrogen it was drawn out to 0·04 sec. The "energy-absorbing" influence of nitrogen as compared with either of the other diatomic gases is well brought out by the results; the radiant energy so absorbed during the combustion being slowly liberated in a kinetic form during the subsequent cooling period, which was thereby considerably retarded.

When $n = 4$. The further retardation in the attainment of P_m when more argon was added was just what might have been expected with a purely "diluent" gas. The "chemical mass" influence of the additional carbon monoxide or oxygen upon t_m is again very manifest; but with nitrogen as the diluent, t_m becomes as long as 0·190 sec. The "energy-absorbing" effect of nitrogen during the combustion has now become very marked; and the liberation in a kinetic form of the energy so absorbed was traceable far into the cooling period.

When $n = 6$. A point has now been reached when the "chemical mass" effects of the additional carbon monoxide or oxygen upon t_m are largely counterbalanced by their "diluent" effects; and especially was this so in the case of oxygen. But the most striking feature of all is the "energy-absorbing" influence exerted by the $6N_2$ diluent, which caused the t_m to be drawn out to as long as 1·100 secs. Also the ratio P_m/P_i was reduced from the 7·9 obtained with the 6CO as diatomic diluent of the same density to 6·4, or by nearly 20 p.ct.—a result that speaks for itself. These features are all well brought out in the following pressure-time curves (fig. 12).

Perhaps the following graphs (figs. 13 and 14), which show the influence of the successive dilutions in question upon t_m and the observed ratios P_m/P_i respectively, will indicate the significance of this part of the experimental evidence. In fig. 13 are plotted as abscissæ the values of t_m in seconds against the R-diluent concentration as ordinates ($n = 2$, 3, 4, and 6 respectively), except that the $6O_2$ and $6N_2$ values are not shown, the last-named ($t_m = 1·100$ secs.), because it would have come much too far away on the right-hand side of the diagram to be included.

It should be noted (1) how the "chemical-mass" effect of the excess carbon monoxide or excess oxygen pre-

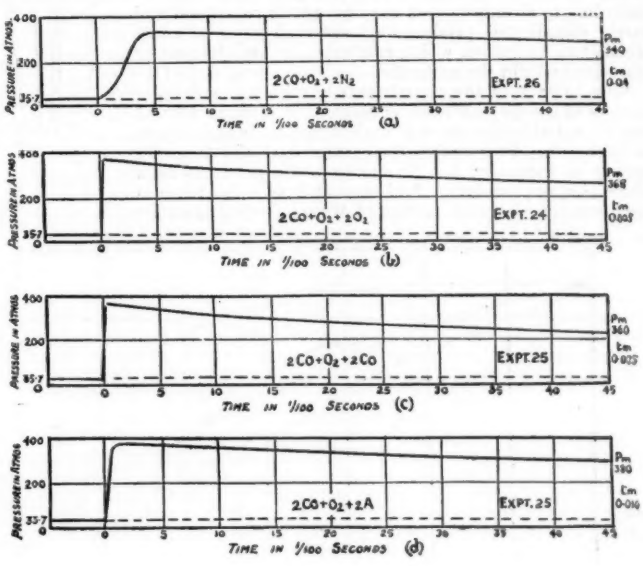


FIG. 11.

TABLE II.—*Results of Experiments with Mixtures* $2CO + O_2 + nR$ *(where n was varied, and* $R = Ar, CO, O_2$ *or* N_2*).*

Experiment No.	Approximate Mixture.	Percentage Composition of Mixture.				Initial Temperature, °C.	t_m (secs.)	Pressure in Atmospheres.			Σ K.C.U.	Ratio P_m/P_i.
		CO.	O_2.	N_2.	Ar.			P_i.	P_m.	P_f (corr.).		
22	$2CO + O_2$ . . .	64·38	32·03	3·59	..	18·0	0·005	21·4	245	14·2	9·9	11·5
23	$2CO + O_2 + 2Ar$.	39·65	19·37	..	40·98*	15·8	0·010	35·7	380	28·5	10·3	11·4
24	$2CO + O_2 + 2O_2$.	39·10	57·64	3·26	..	17·8	0·005	35·7	368	28·4	10·1	10·3
25	$2CO + O_2 + 2CO$.	75·01	20·89	4·10	..	17·2	0·005	35·7	360	28·4	10·6	10·01
26	$2CO + O_2 + 2N_2$.	40·38	19·89	39·73	..	16·6	0·040	35·7	340	28·3	10·3	9·55
21	$2CO + O_2 + 4Ar$.	28·67	14·45	..	56·88*	17·5	0·025	50·0	510	42·72	10·4	10·20
9	$2CO + O_2 + 4O_2$.	28·36	67·91	3·73	..	18·4	0·005	50·0	460	42·70	10·1	9·20
15	$2CO + O_2 + 4CO$.	80·98	14·76	4·26	..	16·5	0·010	50·0	450	42·51	10·6	9·00
16	$2CO + O_2 + 4N_2$.	28·48	14·27	57·25	..	15·6	0·190	50·0	415	42·62	10·3	8·30
27	$2CO + O_2 + 6Ar$.	23·11	10·89	..	66·00*	17·8	0·140	64·3	620	57·7	10·0	9·7
28	$2CO + O_2 + 6CO$.	83·40	12·33	4·27	..	18·2	0·130	64·3	510	57·6	11·3	7·9
29	$2CO + O_2 + 6N_2$.	23·41	11·11	65·48	..	16·8	1·100	64·3	410	56·9	10·3	6·4

* N_2 in mixture would be about 2 p.ct.

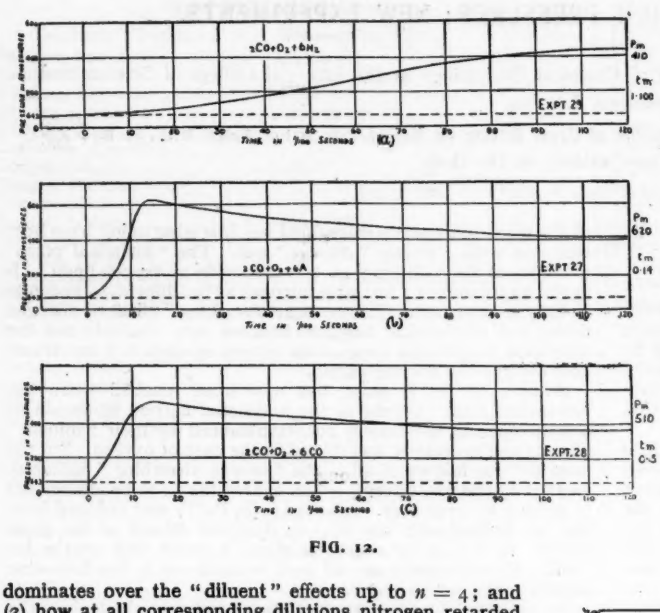


FIG. 12.

dominates over the "diluent" effects up to $n = 4$; and (2) how at all corresponding dilutions nitrogen retarded the attainment of maximum pressure much more than did the inert diluent argon.

In fig. 14 are plotted as ordinates the observed values P_m/P_i against the R-diluent concentrations as abscissæ ($n = 0, 2, 4$, and 6 respectively); and perhaps a few words about the significance of the differences between the argon ordinates and those of the other diluents at corresponding concentrations may be helpful.

The energy of a gaseous system such as we are considering is, of course, comprised partly of translational motions of its molecules as a whole, and partly of motions of some kind internal to these molecules. The former causes pressure (temperature), but the latter (which according to circumstances may be partly rotational and partly vibrational) produces no external physical effect other than radiation, which originates in high-frequency vibrations within the molecule.

Now, in each of the experiments in question a definite amount of energy (thermally equivalent to about 10 K.C.U.S) was liberated by the union of carbon monoxide and oxygen in the bomb. Presumably the greater part of this would appear as increased kinetic energy of the products as a whole (*i.e.*, as pressure). And inasmuch as an increase in the mean translational motion of the molecules of either

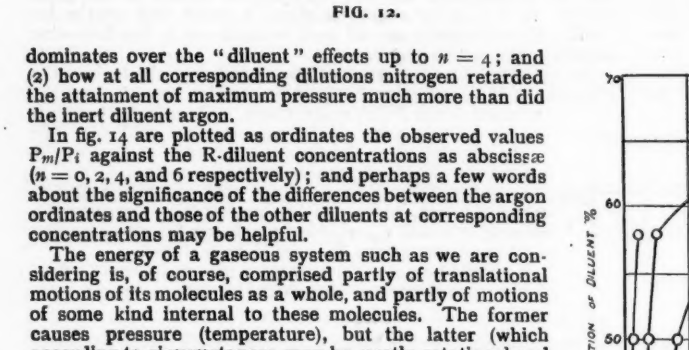


FIG. 13.

FIG. 14.

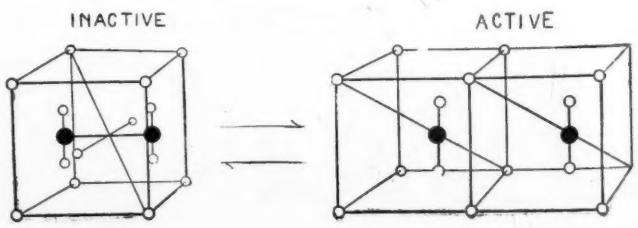
carbon dioxide or any diatomic diluent implies also some corresponding increase in their internal rotational energy, but not so in the case of a monatomic gas such as argon, it therefore follows that the difference between the argon diluent ordinates and those of the carbon monoxide or oxygen diluent experiments at corresponding concentrations may be regarded as substantially representing the increased intra-molecular "rotational" energy of the last two named. In the case of the nitrogen-diluent experiments, the observed ordinates are subject to a "cooling correction" before they are strictly comparable with the others, because of the longer times always taken to attain the maximum pressure. But even when so "corrected," they would show a decided absorption of kinetic energy during the combustion period, which may be attributed to the secondary formation of some nitric oxide from the "activated" nitrogen primarily formed.

The lesser part of the energy liberated in explosions would manifest itself as "radiation" of wave lengths characteristic of burning carbon monoxide—*i.e.*, of incipiently forming carbon dioxide molecules in a highly vibrating state such as would result from CO and : O collisions. Now when nitrogen is present as a diluent it is able to intercept part of the "radiation," whereby it acquires energy of a vibrational kind which may be intense enough even to dissociate the two atoms of its molecule, and, in any case, "activate" it chemically. Such an absorption of radiant energy presumably would not affect the ratios P_m/P_i, except in so far as any part of the nitrogen primarily "activated" successfully competed with the burning carbon monoxide for the available oxygen, and thus became oxidized to nitric oxide during the combustion period. Indeed further experiments (now proceeding) have shown that such nitrogen "activation" is materially influenced by the initial pressure at which the explosive mixtures are fired. This is an aspect of the matter which time does not permit me to follow up to-night.

There is, of course, nothing new in the idea of an "active" form of nitrogen, for ten years ago the Hon. R. J. Strutt (now Lord Rayleigh) discoursed upon it in this room, and showed how ordinary nitrogen is chemically "activated" when subjected at low pressures to a Leyden jar discharge, whereby it glows and acquires the power of combining with various substances towards which it is normally inert. Such "active" nitrogen was found to be strongly endothermic; and Strutt favoured the view that it consists of dissociated nitrogen atoms, when recombination to ordinary nitrogen caused the characteristic after-glow.*

Another view of the "activation" of nitrogen has been suggested which does not necessitate the complete dissociation of nitrogen molecules. According to Langmuir's statical representation of atomic constitution, there is a great similarity between the configuration of carbon monoxide and nitrogen molecules in the ordinary state, a circumstance to which he has drawn special attention. He considers that both molecules are capable of existing in two forms, in one of which (the ordinary and more inert form) the two positive nuclei are both symmetrically located within one and the same outermost shell of eight electrons, whereas in the "active" form they are situated each within one of two shells, which have four electrons in common (*vide* sketch below). According to this, not only

* Proc. Roy. Inst., Vol. XX. Part 3 (1914), pp. 656–661.



would the "activation" of each gas be brought about by a reversible transformation from the one configuration into the other, but also an inert nitrogen configuration should be capable of being activated through resonance with a carbon monoxide molecule of similar configuration undergoing combustion.

It is interesting now to recall the following passage from one of Faraday's letters to Schönbein, which was quoted by the Hon. R. J. Strutt (now Lord Rayleigh), when lecturing in this place on "Active Nitrogen" ten years ago: "What of nitrogen? Is not its apparent quiet simplicity of action all a sham? Not a sham, indeed, but still not the only state in which it can exist. If the compounds which a body can form show something of the state and powers it may have when isolated, then what should nitrogen be in its separate state?" Perhaps the behaviour of nitrogen in our high-pressure carbon-monoxide-air explosions will help you to realize more fully the deep significance of Faraday's words.

In the earlier part of my discourse I drew your attention to the peculiar influence of a small addition of hydrogen to a carbon-monoxide-air mixture undergoing combustion, whether at atmospheric pressure or when exploded at high pressures in the bomb. We have also found that a similar small addition of hydrogen to a normal carbon-monoxide-air mixture undergoing combustion at high pressures is prejudicial to the "activation" of nitrogen. This is a point of considerable theoretical as well as practical interest; and had the time permitted, I would have liked to enlarge upon its significance, and to explain how well it harmonizes with the views which I have put forward respecting the mechanism of carbon monoxide combustion.

Leaving the many theoretical issues raised by our experiments to be settled by a further appeal to facts as the investigation proceeds, I perhaps may be permitted to indicate in conclusion one or two directions in which, if followed up with adequate means and resources, the work might lead to results of further interest.

In the first place, we have already in some of our experiments attained extraordinarily high temperatures; and we could go even higher were it not for the fact that we are approaching the safety limits of the bomb. If funds were forthcoming for the construction of a new bomb, with the necessary accessories, to enable us to work at still higher initial pressures than we have hitherto employed, we should be able to study the effects of subjecting small quantities of diluent gases to the combined influence of exceedingly high temperatures and intensive radiation. This is an aspect of the research which we are hoping it may be possible for us to pursue in the interests of science.

It is also obvious that our results may have considerable bearing upon the problem of nitrogen fixation. For, having proved that nitrogen can be activated by the combustion of carbon monoxide at high pressures, especially when hydrogen is as far as possible excluded from the system, we have in blast furnace gas an almost unlimited supply of just the right kind of raw material from which undoubtedly nitric acid could be easily produced under the conditions indicated by our experiment. And in view of the national importance of nitrogen fixation, we hope these possibilities will be thoroughly explored at home, and not left entirely to foreign organizations, who will probably not be slow to seize upon them.

I trust that enough has been said to convince you that high-pressure combustion work is opening-up new possibilities of extending our knowledge, and that however much chemical research may have taught us concerning flame and combustion since the time of Davy, there still remains a vast amount to be learnt.

ADDENDUM.

It may be noticed that support is given to the views advanced in the foregoing discourse concerning the similarity between the electron configurations of nitrogen and carbon monoxide, and their capability of acting in resonance during explosions, by a paper appearing in the Proceedings of the Physico-Mathematical Society of Japan for April last, in which H. Nagaoka discusses the band spectra of nitrogen and carbon monoxide respectively. For if (as Langmuir supposes) the electron configurations of these two gases are similar, their band spectra should be in close agreement; and this is shown to be the case. The author, however, remarks that the specific heat ratios of the two gases are incompatible with Langmuir's assumption of the two nuclei being in the same cube; and he suggests an alternative model, in which two cubes are joined at an edge (*vide* "Nature," June 23, 1923, p. 859).

The late Mr. James Robb, of Chepstow, left £2887 gross (net £2857).

By permission of the authorities of the British Empire Exhibition (1924), a visit of members of the Society of Engineers and their friends has been arranged to Wembley, to view the construction of the exhibition and the stadium, on Wednesday, Sept. 19, at 2.30.

The ninety-first annual meeting of the British Association or the Advancement of Science will be held at Liverpool from Sept. 12 to 19. The President (Prof. Sir Ernest Rutherford, F.R.S.) will deal in his Inaugural Address with "The Electrical Structure of Matter."

MODERN GAS-PRODUCERS.*

Reviewed by HARALD NIELSEN, F.C.S., A.M.I.Mech.E.

THIS book by Mr. N. E. Rambush comes forward at an opportune moment, and makes producer users in the various industries realize that unless a producer is properly looked after, and is under intelligent control the whole time, the loss and waste of heat units is of a magnitude which can scarcely be imagined. Then, again, there is producer gas and producer gas; and unless the specific gas requirements, the most suitable composition, heating value, &c., are closely studied for each particular purpose, and to a far greater extent than up to the present, the cost of production when producer gas plays an important part will always be high. Take steel-works practice. Here a gas is wanted high in CO and CH_4, and low in H_2, and of as high a flame temperature as possible. It was stated at the Cleveland Institute that a 10 p.ct. increase in flame temperature would mean a saving in gas consumed of not less than 20 p.ct.; and the same will be the case in other instances. No industry can afford to be without scientific control, nor can gas-producers.

Mr. Rambush's volume is more than a mere book on modern gas-producers. It is a proper text-book; and the theory is put forward in a way which not only gets to the bottom of things as far as we know at present, but unravels knotty problems in such a manner that anybody with ordinary intelligence can follow the procedure with ease. The great number of tabulated observations by the author and other investigators forms a most valuable, and practically inexhaustible, stock of information.

Another feature of the book is that at the end of each important chapter there is a short summary of pros and cons, strictly impartial, by the author; and these summaries form an excellent guidance for the reader. It is most unusual to find anything of this nature in the greater number of text-books on similar subjects nowadays. They are more or less a collection of catalogued cuttings, containing glorified statements of the various systems, processes, or apparatus, as if the statements were written by the interested parties themselves, and without the slightest attempt by the author to provide sound criticism in any shape or form. This completely leaves the reader to the tender mercies of conflicting statements, without offering any helpful guidance or personal suggestions.

It is refreshing to come across a book so free from "scissors-and-paste" authorship, and written by a man who, from his position as chief engineer in the service of one of the oldest and largest gas-producer concerns in this country, can safely be relied upon as knowing something of the matter he is writing about. The book is full of properly-illustrated tables and curves dealing fully with all the best-known types of gas-producers, and is a compliment to author and publishers alike, and, in spite of the somewhat high price (55s. net), ought to be in the possession of everybody interested in gas-producers, however poor the interested man may be.

If a few suggestions might be offered, I would urge that a short patent list, carefully sifted, of the most interesting producers and producer processes be appended, say, for the last ten years, in a somewhat similar manner to that employed in Lunge's books. A list of such a nature would be most useful for anybody with an inventive turn of mind. Another suggestion I would make would be to employ a somewhat different laboratory test method than the one supplied—one which would give a better idea of what the tar would be like on a practical scale, and which, furthermore, would give some better clues as to the enriching gases, or, rather, distillation gases.

On page 113 the author says "in all cases, however, the tar obtained in practice is of a different composition to that obtained by the laboratory test." This statement is fully borne out by the comparative tables. Lower down on the same page, in the summary, it is stated that "the constitution of a fuel is as yet an unknown factor. Therefore, the best means at present which will enable a practical man to obtain an idea as to the possible tar-oil yield and composition is to carry out a laboratory distillation test." On the lines the author suggests this should be done, these two statements seem to be of a somewhat contradictory nature. Dr. Harold Colman, in the discussion of the Rambush paper before the Society of Chemical Industry, December, 1921, clearly pointed-out the fallacies connected with taking the laboratory method described as a guidance to what might be expected on a large scale.

The methods of analyzing the gas on the large scale might perhaps have been a little more explicit, as only four to five pages out of a total of five hundred deal with this important subject. The modified Orsat which Mr. Rambush describes, though a practical instrument, does not in my opinion meet the full requirement of the hydrogen analysis, particularly as only a small part of the residual gas can be exploded, which fact consequently multiplies the error greatly. I take it that the Orsat is primarily designed for use by people who are not always expert gas analysts, and that consequently the reading-off and exact mixing with air for the explosion pipette for the hydrogen and methane determination is not always accomplished with the desired accuracy. The explosion pressure may be so high that losses occur. Most people know how galling it is to lose the residual gas and have to

* "Modern Gas-Producers" by N. E. Rambush. Published by Messrs. Benn Brothers, Ltd., No. 8, Bouverie Street, E.C. 4. Price, 55s. net.

start all over again. The Jaeger method of hydrogen determination deals with the whole of the residual gas, is very easy and simple to accomplish, gives exact results, and could readily be embodied in the improved Orsat apparatus.

FACTORIES AND WORKSHOPS REPORT.

There was issued last week from H.M. Stationery Office, Imperial House, Kingsway, W.C. 2, and branches, at the price of 5s. net, the Annual Report of the Chief Inspector of Factories and Workshops (Mr. Gerald Bellhouse) for the year 1922; and, as usual, it contains a series of chapters by the inspectors having charge of various branches of industry. The Chief Inspector points out that trade conditions remained at a very low ebb; but the reports of the inspectors confirm, on the whole, the views expressed elsewhere that there are signs of a turn in the tide, and that a gradual revival is taking place in some of the more important industries. Circumstances have therefore again been such as to discourage expenditure on extensive industrial developments, though developments worthy of note have taken place here and there. In some cases, at all events, employers have been utilizing the period of slackness to modernize their plant, so as to be prepared to take full advantage of trade revival.

One matter in which more interest is being taken is research. Among some instances quoted, it is stated that "the National Benzole Association, an important central industrial organization which comprises some 120 firms engaged in bye-product coke and gas manufacture, has decided to seek association with the Leeds University on the lines of the Joint Research Committee of the University and the Institution of Gas Engineers." The Department suffered an irreparable loss through the sudden death last May of Mr. R. E. Graves, C.B.E., the late Chief Inspector—a man of high qualifications, who enjoyed the admiration and respect of every member of the staff. The special Engineering Branch has again proved itself to be of great value. The Departmental Committee on Lighting issued in March their third report, which dealt more particularly with adequacy of lighting, and with standards to be adopted for fine and very fine work. The Committee also urged the need for further study of lighting conditions in different industries; and steps to this end are being taken both departmentally and through some of the Joint Industrial Councils.

There is, it is remarked, at the present time no problem before the Factory Department which calls for more constant and continuous consideration than that of accident prevention; and therefore the lines on which it is being attacked are indicated somewhat fully. Accidents due to machinery represent rather less than one-third of the total; but it is with this class that the Factory Acts are specially concerned, and with which therefore the inspectors have more particularly to deal. One line of attack is the publication of illustrated safety pamphlets and leaflets, in which information is provided as to the dangers which are to be anticipated with different kinds of machinery and plant, and as to the manner in which they can best be met. A list of new publications in this connection will be found in the report. It is, however, admitted that, when everything possible has been accomplished in this way, there will still remain a large number of accidents against which no material safeguards can be provided; and these can be eliminated only by the establishment of efficient safety organization within the works, by fostering a spirit of safety, by educating all concerned to carry out their work in a careful manner—in short, by the adoption of "safety first" principles. The Department are represented both on the Executive Council and on the Area Committees of the British Industrial Safety First Association. The reports regarding the progress of this movement are said to be on the whole disappointing, though two satisfactory features emerge. First, it is evident that the movement is being taken more seriously; and secondly, the reports from all parts of the country refer to the establishment of Safety Committees of greater or less efficiency in a large number of different works. Renewed evidence is forthcoming of the extraordinary results which may be anticipated where the organization is efficient. There is still an immense field to be developed in this direction.

The new Chemical Works Regulations, which did not come into force until Oct. 1 last, contain provisions making it obligatory, before any person enters any place where there is reason to apprehend the presence of dangerous gas, for a responsible person, specially appointed for the purpose, personally to examine such place, and to certify in writing that it is isolated and sealed from every source of gas or fume, and is free from danger. A good example of a form of certificate used in a tar-distilling works is included in the report.

At the opening of a section on lighting, the following remarks appear:

> The question of lighting in industry has certainly not received in the past the attention which it deserves; but there is evidence that the importance of good lighting and its effects upon both the health and safety of the workers are being realized, and that more consideration is being given to suitable methods of lighting adapted to the varying nature of the work.
>
> The publication during the year of the third report of the Departmental Committee on Lighting in Factories and Workshops has stimulated interest in the subject; and the recommendations contained therein have formed the basis of discussion at some meetings of the Joint Industrial Councils, a notable example being the Hosiery Joint Industrial Council. Several processes in this industry have been classified in the report as "fine" or "very fine" work requiring specially good lighting. The employers' representatives considered that, not only in the workers' interests, but in their own, the report should receive careful consideration. The workers' representatives appreciated this, and enlarged upon the effects arising in many instances from lack of attention to this important matter. They admitted that some manufacturers spent a considerable amount of money on their lighting installations, but urged that others had done very little, and added that it was not so much a case of spending a great deal of money as of making the best use of what was spent. This is really the key to the situation. Vast sums are spent on installations, and much money is wasted on brilliant lighting, ill-adapted to the particular work; and many manufacturers could no doubt reduce their lighting bills by half, and at the same time have more satisfactory results, if they studied the question carefully, and went into all the essential details.

Several inspectors comment on the trying effects of glare, and the need for more attention to shading, especially since the use of half-watt lamps has become general. Mr. Smith (Leeds) reports that the comparative merits of direct as against semi-direct lighting were recently tested at an engineering works in two similar, but separate, departments of the works. Diffused light was more acceptable to the workers, though the ordinary observer preferred the direct light. Again:

> Miss Coombes found in an incandescent gas-mantle factory, where very good light is essential—very fine work being done picking up stitches in the early stages of manufacture of silk mantles—powerful electric lights suspended over the benches, fitted with wide white enamel shades. In the final burning, where there is considerable heat and glare, an excellent anti-glare screen had been erected, consisting of thick anti-glare glass in front, and a lining of mica.
>
> Some inspectors comment on the absence of evidence of accidents attributable to faulty or insufficient lighting; but it seems possible that the majority of these occur in that large group of accidents due to falls. This will be investigated during certain months of the current year, with special reference to lighting; and much valuable evidence may be forthcoming.
>
> A case is quoted as emphasizing the need for attention to upkeep and maintenance of lamps—"a matter that is very often overlooked, especially as regards the cleaning of globes and shades."

A comparative table of accidents from fumes and gases shows an increase over 1921 in the number during the past year from carbon monoxide. Of the 37 cases (with seven deaths) from producer and suction gas, twelve (with one death) occurred in connection with the charging, stoking, &c., of the generating plant, and one from starting the suction gas engine; while eighteen (with five deaths) were due to escape from the exhaust pipe into workrooms. In the matter of coal-gas accidents, of the 32 cases (with one death) four (one fatal) occurred on gas-works. The remaining 28 were from distribution in workrooms as the result of defective fittings and inadequately ventilated gas-stoves. Thus, "an escape from the gas-rings under the glucose pans in a sweet factory penetrated through the ceiling, and affected thirteen persons. Again, seven cases were due probably to escape from a flueless gas radiator in an ill-ventilated workroom." Seven cases (with two deaths) occurred in cleaning tar stills or tanks, and two in cleaning an oxide of iron purifying chamber. The number of accidents due to electricity reported during the year was 309, including seventeen fatal cases; these figures comparing with 322 accidents and twelve fatal cases in 1921. In addition, there were four "dangerous occurrences."

The report contains a lengthy account by Dr. E. L. Middleton (H.M. Medical Inspector of Factories) of an investigation into the dust content of the atmosphere of workplaces in the grinding of metals and cleaning of castings; the records being taken with Dr. J. S. Owens' "Dust-Counter."

Storing Bituminous Coal.

Mr. F. W. Randall, Assistant General Manager of the Rockingham County Light and Power Company, of Portsmouth (U.S.A.), has given in the "Electrical World" a hint which, though primarily intended for central-station storage of coal, should be of interest to other classes of consumers. It has reference to a method of safeguarding coal in storage which has been devised by Mr. W. H. Allen, of the Company's Engineering Department. In this arrangement, pipes are put in place before the coal is deposited. These pipes are used as runways for thermometers, lowered and raised by strong cords marked at regular intervals by knots, which enable the depth at which readings are made to be noted. Then, by reference to an appropriate drawing, the behaviour of the coal in any section of the pile can be studied. When a new load of coal is placed in store, tests of the temperature are made daily in each pipe until the exact conditions in all parts of the pile are determined. The pipes are 2 in. in diameter, and are placed at frequent intervals, and permanently clamped into position. The tunnels from which the coal is drawn for station use are numbered, and shoots 5 ft. apart are installed. If any spot shows signs of overheating, coal is drawn from the nearest shoot until the hot spot is removed. The thermometers are enclosed in wooden frames, to prevent breakage. The arrangement was inexpensive to instal, and has permitted the storage of large stocks of coal to a maximum depth of 40 ft., with a substantial degree of security from fire.

THE PRODUCTION OF AIR-DRIED PEAT.*

MENTION was recently made in the "JOURNAL" of the report of the Fuel Research Board for the years 1922-23, the first section of which is concerned with the production of air-dried peat. The report deals with the investigations on the subject of peat mining and utilization made since 1919. Peat, as it occurs in an undrained Irish bog, contains from 92 to 95 p.ct. of moisture; and by draining the bog, the moisture can be reduced to between 88 to 91 p.ct. Peat cannot be usefully employed as a fuel until the moisture content is reduced to 25 to 30 p.ct. No economic method of drying by artificially-generated heat is yet available; and in every case where peat is used commercially at the present time, it has been air-dried. It is for this reason that the report deals only with this phase of the subject.

During 1920, Prof. P. F. Purcell, M.A.I., M.Inst.C.E., who is Peat Investigation Officer to the Board, visited Canada, in order to become acquainted with the work which the Canadian Peat Committee were carrying-out for the Federal and Provincial Governments on the mechanical winning of peat; and in 1921 Germany and Sweden were visited for the purpose of studying the latest practice in these countries. The results of these investigations are embodied in the report, and contain much important information concerning the cost of production of the peat by various plants. Serious efforts have been made in these countries towards the solution of the problem of winning peat, which consists of the preparation of a fuel in the form of blocks or briquettes containing 15 to 30 p.ct. of moisture from the raw peat in the bog, which may contain as much as 95 p.ct.

In the introduction, it is stated that there are four possible methods of reducing the moisture content of the peat:

(*a*) Air-drying in the open or under cover.
(*b*) Evaporation by artificial heat.
(*c*) Mechanical pressure.
(*d*) Electrical osmosis.

Attempts have been made, and are still being made, in almost every country in which peat exists, to drive off the moisture by the application of heat. Systems involving pressure and combinations of heat and pressure have also had extensive trials; but the fact remains that there is no process based on these methods which is to-day working on a commercial basis. With regard to electrical osmosis, owing to the decreased conductivity of the peat with reduced moisture content, the power required to effect the removal of moisture to a sufficient degree becomes so great that the process has not so far proved economic.

An account is given of the preparation of peat powder, which has been attempted in Sweden. The peat is spread on the bog surface in the form of blocks, and is air-dried in the ordinary way till its moisture content is less than 40 p.ct. It is then collected, pulverized, sifted, and finally passed through drying-ovens till its moisture is reduced to between 12 and 15 p.ct. Even this process, it is stated, in which so large a proportion of the original water is removed by air-drying, and on which considerable capital has been expended, cannot be said to have proved commercially successful, as only one factory out of three erected in Sweden is still working.

It has often been suggested that peat with a moisture content of 60 p.ct., and even higher, could be used in gas-producers for the production of gas for industrial purposes, and particularly in connection with the recovery of ammonia. Of the many large-scale installations constructed to work on these lines, all except one have closed down. With the failure of these plants to give commercial results, there is no longer the same incentive to devise processes for the partial dehydration of peat.

Experiments were carried out at Turraun on the rate of drying of machine-formed peat exposed in varying conditions of weather, the results of which are set-out clearly. There are two important factors which militate against the extended use of peat. For every ton of air-dried peat containing 25 p.ct. of moisture, 7½ tons of raw material must be handled, even in the case of a drained bog. The other point is that the calorific value of anhydrous peat is but 10,000 B.Th.U. per lb.; and it would be safe to take the average value for air-dried peat as 6900 B.Th.U. per lb. A ton of coal in bunkers occupies about 45 c.ft., whereas a ton of air-dried machine-formed peat takes up about 90 c ft. Hence for equal thermal effect with coal, 1¾ times as much peat by weight must be transported, taking industrial coal at 11,500 B.Th.U. per lb. Thus if peat is to compete with coal, only the minimum of labour and capital must be expended per ton produced.

The report is of an extensive character and will be of great value. Prof. Purcell has dealt with the many difficulties of, and visualized possible schemes for, peat winning on a scale of 100,000 tons per annum from one bog area over a period of years. He has dealt with the imaginary case of a rectangular bog extending over 8 sq. miles, and has shown for the first time the vital importance of the initial lay-out for a definite scheme of annual development over a long period. Mr. E. J. Duffy, B.Sc., M.E., has carried out an investigation into the properties of air-dried peat, and the factors which govern the rate of drying. The results of his work form an appendix to the report.

* Report of the Fuel Research Board for the Years 1922-23. "The Production of Air-Dried Peat." H.M. Stationery Office, Imperial House, Kingsway, W.C. 2. Price, 5s. net; by post, 5s. 4d.

SANITARY INSTITUTE CONGRESS.

This year's congress of the Royal Sanitary Institute, which took place in Hull, had much in it of interest and encouragement to the gas industry.

The persistent efforts of the British Commercial Gas Association in the cause of smoke abatement and social hygiene are evidently bearing fruit; and it is gratifying to note the marked interest now being taken in this important aspect of national health. The Royal Sanitary Institute have successfully tackled such problems as a pure water and pure milk supply, and, with their immense influence and representative membership, may be hopefully expected to rouse a really lively public opinion regarding the crying evil of atmospheric pollution. Several papers of great interest in this connection were read and discussed at the congress; and the undoubted and growing enthusiasm of many leading medical men is most hopeful. Papers by Prof. Cohen and Mrs. Cloudesley Brereton were of special value; and the discussions on both were keen and broad-minded.

At the Health Exhibition—which is a popular side-line of the congress—the British Gas Light Company (as might be expected by those who know Mr. H. E. Copp and his staff) made an excellent display of modern gas apparatus. On their stand, which obtained a coveted Institute Bronze Medal, the Special Smoke Abatement Exhibit of the "B.C.G.A." was an interesting feature attracting considerable attention.

Among the official delegates at the congress were Messrs. H. E. Bloor (York), H. E. Copp (Hull), J. Kelly (Bridlington), and W. M. Mason ("B.C.G.A.").

Chemists and the Gas Industry.

Writing in the "Gas Age-Record" on the need and function of the chemically trained man in the gas industry, Mr. H. O. Andrew says that the manufacture of gas is essentially a chemical industry, yet it has made comparatively little progress in comparison with other chemical industries, because too many problems of theoretical chemistry have been left to the mechanical engineer for solution. Large sums of money are spent on plants to lower production costs by adopting labour-saving devices and by obtaining greater outputs per unit. Increasing importance is being given to the mechanical control of plant operations, with the result that a great deal has been accomplished along the lines of mechanical and operative development, while chemical development has advanced relatively little. When gas chemistry is spoken of, it is usually understood that this consists of making routine tests on gas, its bye-products, and raw materials. This is all too true in many cases; but it is far from being the chemistry of gas manufacture. There are great possibilities in the practical application of theoretical chemical principles to the gas industry (an industry dealing with solids, liquids, and gases, and with all the chemical laws ruling them), governed by the complex physical chemistry involved in the treatment by heat of hydrocarbons for transformation into various products, utilizing the laws dealing with vapour pressures, dissociation, polymerization, catalysis, decomposition, &c., with the many variables of temperature, pressure, concentration, time, and contact surface offering a great flexibility in the possible character of the end-products. The viewpoint and method of attack of the mechanical engineer and the chemist vary widely, except when that rare individual is found who can formulate theoretical principles and apply them practically.

Developing the Gas Industry.

Some suggestions for the development of the gas industry have been made in the pages of the "American Gas Journal" by Mr. W. D. Wilcox, of the East Idaho Gas Company, who remarks that no programme can be worked-out in detail. So large a problem as making gas the universal fuel wherever pipes can be laid is one which can be solved only by united action and the meeting of many minds. He makes suggestions for definite changes in the existing economic order which will contribute to this result; but he is careful to emphasize that, along with them, there must be a disposition on the part of the public to permit the men in the industry and those who supply the capital to share in the benefits of a very great development in the industry. His suggestions are: (1) A substantial tax upon every ton of bituminous coal mined which is burned in the raw state within the limits of a municipality. The revenue from this source could be used to make good the deficit created by (2) exempting the property of the gas utility from any form of taxation. (3) The adoption of a three-way system of charge for gas which will as nearly as possible make the charge to the user correspond with the cost of serving him. (4) The abolition of all standards of quality in gas which prevent the exercise of the fullest freedom on the part of those operating the gas utility in making and sending out the product which investigation shows them will, under the conditions existing at the particular time and place, enable them to give the largest value in service for a dollar of cost. (5) Continued study by gas engineers, with the encouragement and support of those who are connected with the industry as builders of gas plant and manufacturers of gas-burning appliances, of means and methods by which the labour cost of gasification may be reduced, the thermal efficiency of generation increased, and the right materials made more available.

REGISTER OF PATENTS.

Producing Water Gas.—No. 182,101.

TRENT PROCESS CORPORATION, of Washington, D.C. (Assignees of W. E. TRENT, of Washington, D.C.)

No. 15,335; May 31, 1922. Convention date: June 21, 1921.

This invention relates to the production of water gas by charging a generator with carbonaceous material, which is subject to alternate blowing and gas-making operations. In such processes, the carbonaceous material is generally in lump form, and generators are charged with comparatively small quantities of lump coal or coke at frequent intervals during gas-making periods. The patentees object that in these processes a material portion of the volatile content of the coal is consumed during the blowing operation. They point out, however, that it has been proposed to introduce, during the gas-making period, either finely-divided coal or hydrocarbon oil. In such practice the volatile matter is immediately distilled from the incoming fuel, and the carbon particles are deposited on the fuel bed. It has also been proposed to use finely-powdered coal as above, and to introduce oil into another part of the apparatus which is in effect a carburetter, for the purpose of making illuminating gas.

According to the present invention, the finely-divided solid carbonaceous material and the oil are introduced into the generator together, preferably in the form of thin ribbon-like streams—an amalgam of coal, oil, and a small quantity of water.

The patentees also object that when, as in present-day practice, oil is introduced into a separate carburetting chamber, a specially prepared and high priced oil must be used in order to prevent excessive carbon deposits in the checkerwork of the carburetter. When the oil is introduced with the coal to the generator, they claim that cheaper oils can be used because any free carbon resulting from the cracking of the oil is deposited into, and becomes a part of, the carbon mass, and is either converted to blue water gas or consumed in blowing-up the temperature of the generator. The carburetter of the usual plant can ordinarily be dispensed with when operating with the amalgam, but it has been found that the standard water-gas plant, including the carburetter, may be used, in which event the carburetter is in effect an auxiliary superheater. If, however, further enrichment is necessary, this can be accomplished by introducing oil to the carburetter.

Parabolic Radiators.—No. 187,230.

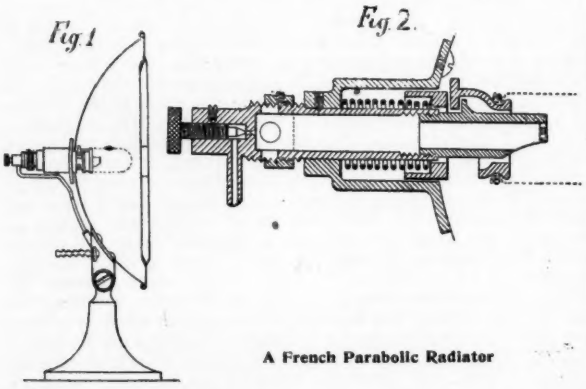
GARBARINI, A., of Courbevoie.

No. 27,714; Oct. 12, 1922. Convention date: Oct. 12, 1921.

This invention relates to the construction of heating radiators with incandescent gas-mantles, in which a so-called inverted mantle is placed horizontally at the focus of a parabolic mirror.

The patentee states that in order to obtain good functioning of these radiators, it is very important that the mantle should be located in the axis of the mirror, and should be maintained in this position in an elastic manner. Accordingly, he arranges that the hook arms of the annular supporting gallery are maintained perpendicularly upon plain ears formed solid with the steatite or porcelain burner, and yet remain elastically in this position, by the pressure of a metal ring acted upon by a spiral spring.

The employment of ordinary inverted burners disposed horizontally in heating apparatus of this kind does not give completely the results sought for from the point of view of heating because the mixture of air and gas rises to a very considerable extent towards the upper part of the mantle, which is consequently superheated, while the lower parts are only slightly heated. This fact is shown by an irregular incandescence of the surface of the mantle. In order to obtain uniform incandescence, the latter, according to the invention, is mounted upon a burner the end of which, where the mixture issues, is provided with holes at its upper part, while the lower part is bevelled off in such a manner as to cause a greater quantity of mixture to flow to the lower parts to the mantle. Further, to obtain the emission of red or lower red rays which give the best calorific output, the mantle should be made with wide meshes and of thick texture.



A French Parabolic Radiator

We reproduce a side view of the radiator (fig. 1), and a sectional view (fig. 2) of the burner, &c. The general construction of the latter, and the air and gas regulating arrangements (which are covered by the claims) will be readily understood from these.

Burners.—No. 200,026.

SCHULMEYER, J., of Frankfurt a/M., and HILDMANN, P., of Klein-Schwalbach.

Patent of Addition to No. 175,962. No. 30,816; Nov. 10, 1922.

The subject of this invention is a modification of the burner described and claimed in Patent No. 175,962 (see "JOURNAL," Vol. CLX., p. 741).

In accordance with the present invention, there is provided a burner with a tube, into one end of which leads a compressed air supply pipe, and into the side wall of which leads a gas supply pipe, in such manner that the gas supply branch, closed at its end, has an outlet located in the axis of the tube and directed towards the stream of compressed air. From the other end wall of the burner tube extend several small tubes terminating at different heights. A branch enters the side wall of the tube, and serves for a separate supply if desired.

Reduction of Organic Compounds.—No. 200,167.

ADAM, W. G., SIDERFIN, N. E., MURDOCH, D. G., and GALBRAITH, W. L., all of the Gas Light and Coke Company.

No. 9564; April 3, 1922.

This invention is for an improved method of effecting reduction, and has particular reference to the reduction of organic compounds. It concerns that class of process in which an alkali amalgam is used as the reducing agent. The compound to be reduced is brought into contact with the amalgam, preferably in the fluid state, in the form of an emulsion comprising the compound and a reagent which is decomposable by the metal with the production of hydrogen. To minimize frothing, the emulsion and amalgam are brought into contact by causing the former to flow in the form of a film over the surface of the latter. The emulsion may flow repeatedly over the amalgam—with re-emulsification, as may be required, before fresh contact—until the desired degree of reduction has been effected. The emulsion may be produced by mechanical means, or with the aid of emulsifying agents. The process of reduction may be carried out in conjunction with the process for the electrolytic production of chlorine and caustic alkali. For the operation of this combined process, with simultaneous production of caustic alkali, the products of reduction must be separable from the alkali solution without contamination of the latter. For example, nitro-derivatives free from acidic groups may be reduced in such a cyclic process. Nitro-benzene is mixed with about one-third to one-half of its volume of water. The mixture is emulsified in a centrifugal pump, and is discharged therefrom into an inclined trough over the surface of the mercury coming from a Castner-Kellner cell. The trough is maintained throughout at 60° to 100° C. The emulsion is withdrawn from the lower end of the trough, re-emulsified, and returned to the top. There results a reduction product comprising azo- and hydrazo-derivatives and amines, which, being insoluble in the caustic alkali, can be readily separated and recovered.

The degree to which the reducible compound and the aqueous reagent are admixed may vary, provided that the association with the amalgam is sufficiently intimate to ensure effective reduction and to avoid mere localized reaction. As a result of experiment, the inventors state that the process is susceptible to a considerable degree of control, chiefly in the direction of varying the concentration of the reducible body in the reduction-mixture. Alteration in temperature may be made for the same purpose, but this is less effective than time-contact.

In the diagrams illustrating the specification, the patentees show an alternative form of reduction vessel, wherein reduction and mixing (which may be to the degree of emulsification) are conducted simultaneously. This consists of a closed container having an internally disposed agitating device and a distributor—for example, a perforated coil or fine grid—for the delivery of sub-divided amalgam through the container. The latter is provided with a constant-level overflow for the purpose of continuously removing the amalgam which has passed through the mixture, and is also furnished with a jacket for the passage of a heating or cooling medium. Generally speaking, it appears that increase of the concentration of the reducible body in the emulsified mixture favours the production of azo- and hydrazo-derivatives in greater yield than the amine.

Liquid Meters.—No. 200,188.

KENT, W. G., of High Holborn, W.C. 1.

No. 9806; April 5, 1922.

This invention relates to liquid meters of the orifice or Pitot-tube type, in which different pressures are conveyed to the two legs of a U tube in which is mercury; a float resting upon the mercury in one leg, and carrying a rod which actuates a pen or integrating mechanism or both.

According to the invention the float rod is connected by links to a spindle which passes out through the wall of the mercury chamber or U tube, and by its rotation actuates a rod carrying the pen or integrating wheel. The arranging of the links so that the angle through which the spindle is turned is large for a small movement of the float when the pressure difference is small, as compared with the angle through which the spindle is turned by the same movement of the float when the pressure difference is large, compensates to a certain degree for the fact that the relation of the flow to the pressure difference does not follow a straight-line law. In order to obtain a still greater compensation, there may be mounted on the spindle outside the mercury chamber a cam round which is wrapped a light flexible band which supports the lower end of the rod carrying the pen. One (or both) of the legs of the U tube may be shaped so that the movement of the float is at its maximum for the lowest pressure differences and at its minimum for the highest pressure differences.

In order also that the meter may be suitable for measuring a rapidly fluctuating flow, such as the rate of feed to a boiler or the flow of the condensate water, the connecting rod is divided into two portions;

the lower portion being sprung to a dashpot, while the upper portion is connected to the piston of the dashpot. By this device any very sudden or violent fluctuations of the pressure difference are absorbed before the resultant motion reaches the recording mechanism.

By the invention the patentee claims to obtain the maximum of power with the minimum quantity of mercury in the U tube, and an equally-spaced movement giving the correct mean registration instead of a movement due to the mean pressure difference; while friction in the whole apparatus is reduced to a minimum, and violent fluctuations in the mercury level are damped out.

An Improved Combined Gas and Electric Cooking Apparatus.—No. 200,394.

MARKS, E. C. R., of Lincoln's Inn Fields, W.C. 2 (a communication from Fabrik Elektrischer Koch- und Heizapparate "Salvis," of Lucerne).

No. 22,648; Aug. 19, 1922.

Instead of our normal extraction and paraphrase of this specification, we feel that quotations from the text will prove enlightening to our readers. We therefore make the following.

"In apparatus of this type as hitherto suggested, a frame or ring adapted to receive the cooking utensil was provided with an electric heating coil around its outer wall and with a gas-burner fixed to its base."

"The object of the present invention is to provide an improved cooking apparatus in which a better utilization of the heat radiated from the gas-flame and from the hotplate is obtained; and with this end in view the invention consists in a combined gas and electric cooking apparatus in which the gas burner or burners are arranged in an aperture or apertures in an electric hotplate."

"The top of the gas-burner is situated at a lower level than the top of the electric hotplate. This is done so that the gas-burner shall not prevent a cooking vessel from seating quite flat upon the electric hotplate."

"An annular grate for supporting cooking vessels when the gas-burner is used, is hinged to the frame. This annular grate is used when it is desired to allow the flame from the gas-burner to play upon the entire underside of the cooking vessel in the usual manner. The heat of the gas-flame which is radiated in the downward direction is taken by the electric hotplate. Consequently, when the gas-flame has been extinguished, the annular grate can be turned back out of the way, and the same or another cooking vessel may be placed upon the electric hotplate for the purpose of utilizing the heat absorbed by the latter."

"The improved cooking apparatus renders it possible for the consumer to take full advantage, according to the varying seasons of the year and hours of the day, of the most favourable tariffs for the consumption of gas and electric current obtaining at such seasons and hours. For example, in places where at certain hours of the day cooking by electric current is dearer than cooking by gas, or *vice versa*, . . ."

"In passing from electric heating to gas heating, the gas-burner is already warmed up, since it has absorbed heat from the electric hotplate which would have been wasted otherwise."

"In case of a stoppage in the supply of gas or electric current, or while the gas-burner or the electric hotplate is out of action or has been sent away for repair, the consumer is always able to carry on with the remaining gas or electric appliance as the case may be."

"Instead of only one gas-burner arranged in the middle of the electric hotplate, a plurality of gas-burners may be arranged at different points of the electric hotplate."

Reel Ovens.—No. 200,218.

JAMES KEITH & BLACKMAN CO., LTD., and KEITH, G., both of Farringdon Avenue, E.C.

No. 10,294; April 11, 1922.

This invention relates to rotary bread ovens, and has for objects to provide a construction which avoids the necessity for opening up the side of the oven to remove the trays, and, in general, to permit the retention of as much steam as possible within the oven casing. Other objects appear from the description. The oven described uses high-pressure gas, so that the usual provision for supply of secondary air and for maintenance of a draught through the oven need not be made.

The structure of the oven casing may be as described in the specification of patent No. 200,219 [*vide infra*]—that is to say, the lateral walls of the casing are constituted by box-like sections forming in effect the boundaries of a prismatic chamber closed at the ends by hollow walls.

Of the drawings accompanying the specification, we reproduce a transverse section (fig. 1) showing, among other details, the disposition of the burners, and an axial section (fig. 2).

Within the chamber is arranged a so-called reel formed after the fashion of a squirrel cage, with two end rings running on rollers carried by bearings on spindles fitted to two A frames; the entire weight of the reel, &c., being thus supported by the A frames independently of the oven casing. The end rings are connected by bars or spindles which carry tubes the ends of which turn on bearings. From each tube depend two stirrups so arranged that as the reel revolves the stirrups continue to hang with the flat step-portion horizontal. Trays, preferably of heavy metal plate, having a substantial capacity for heat, rest on the stirrups, and carry the loaves.

A rotary shaft extends longitudinally through the oven eccentrically of the reel, and carries two pinions each meshing with internal teeth on the relative end ring; the gear ratio being desirably the inverse of the number of bars. Gas-burners are arranged centrally of the reel, and, in addition, near the lower part of the oven; the distribution of top heat and bottom heat being thus variable at will. A door is provided in the forward end wall of the casing in the lower half of the oven; and provision is made whereby any tray can be withdrawn through such door when, by rotation of the shaft, the reel has been turned to the requisite position.

Where the trays are of heavy plate and of considerable weight when charged, they cannot be readily drawn out from the stirrups which carry them. Provision is therefore made for raising the trays on rollers when they are brought into register with the door; the rollers being, of course, kept clear of the trays at other times. Desirably, these rollers are carried by a frame preferably hinged at a point at the back of the oven, and connected by toggle links to a lever at the front, in such wise that when the lever is rocked in one direction the rollers are elevated and lift the tray clear of the stirrups, so that the tray can be drawn out and transferred to a series of rollers on a fixed frame outside the oven; the toggle device being temporarily brought past dead-centre so that the frame is retained in an elevated position, as seen in fig. 2.

The actuating lever is arranged to interlock with a handle or the like on the rotary shaft, so that the lever cannot be actuated unless a tray is opposite the door, and, conversely, so that the shaft cannot be driven when the lever is in the position corresponding to the elevated position of the rollers. To this end, the lever may be arranged to straddle the front end of the shaft, and is movable from a position clear of the handle to a position in interfering relation with the handle. To ensure that a tray, when replaced, shall be correctly positioned, there is fitted at the back end of the oven a hinged stop linked to the hinged frame, so that when the frame is elevated the stop will prevent the tray from being pushed too far in, but when the frame is lowered the stop will drop out of the way. To ensure that the tray, when replaced, will not be left too near the front of the oven, a pusher rod linked to the lever is arranged to push the tray home.

The rotary shaft is preferably tubular, and surrounds a shaft connecting a clutch at the back end of the oven with a hand wheel or the like at the front; the clutch serving to engage the rotary shaft with a chain wheel driven by the same source of power as operates the compressor for supplying high-pressure gas to the burners. The combustion products are allowed to be displaced through an opening near the base into a vertical flue in the back wall.

For certain purposes it is sometimes desired to get rid of the steam within the oven; and to this end a damper, which may be operated by a screw-threaded spindle, is fitted at the top of the flue, to permit the steam to be drawn off. Above this is fitted, preferably, a butterfly damper operable by a lever and rod carrying suitable stops; the butterfly damper forming a main controller for preventing too rapid extraction of the combustion products, and being set so as just to allow their escape by displacement from the oven.

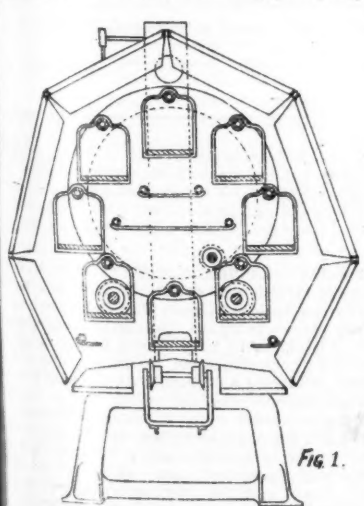


FIG. 1.

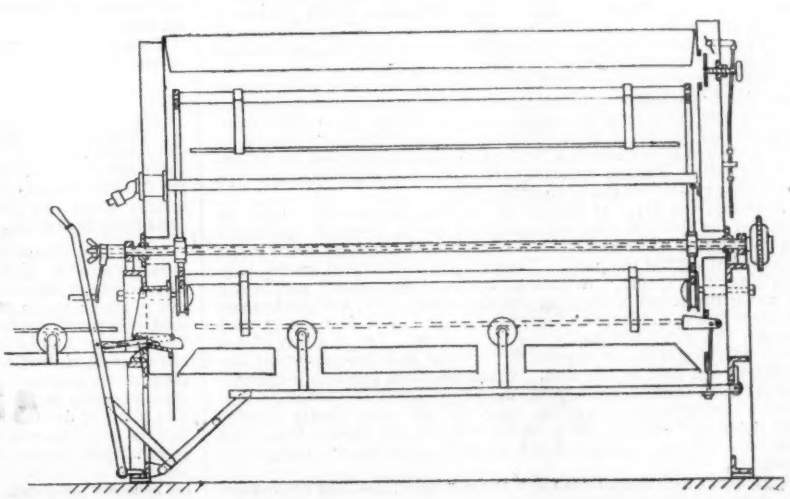


FIG. 2

A Keith-Blackman Rotary Bread Oven.

Casings for Bread Ovens.—No. 200,219.

Keith and Blackman Co., Ltd., and Keith, G., both of Farringdon Avenue.

No. 10,295; April 11, 1922.

This invention relates to ovens or other internally-heated apparatus, for example rotary ovens for use, *inter alia*, in baking bread, and has for its primary object to provide a construction of casing which, while allowing free circulation of products of combustion within the casing, prevents leakage of such products from the interior into the lagging for the walls and/or roof, and also prevents undesired local condensation and accumulation of condensed products.

According to the invention, the walls and/or roof of the casing are constituted of box-like sections joined together, and individually so formed that no ribs are required. The construction appears in outline in fig. 1 illustrating patent No. 200,218 (*ante*).

The sections consist in effect of sheet-metal boxes of which the sides are bent up and the corners welded, so that there is no joint through which the products of combustion may leak from the inside of the casing into the lagging with which the boxes are filled. The boxes are fitted with covers jointed on in any suitable way; but as the opening of these joints is exposed to the outside, there is no risk of the products of combustion finding access through them to the lagging. This construction also allows for the difference of expansion between the inside and the outside. The joints between the boxes are made only at the extreme outside edges.

Prepayment Mechanism.—No. 200,298.

Staples, C. W., of Battersea, S.W. 11, and Glover, Geo., & Co, Ltd., of Warrington.

No. 14,323; May 20, 1922.

The object of this invention is to provide an improved prepayment mechanism adapted particularly for use with gas-fires, &c., in hotels, and for similar purposes. One difficulty in apparatus of this kind is to arrange that the valve shall close suddenly, and without a preliminary throttling of the gas supply, as soon as the purchased quantity of gas has been delivered; and the patentees claim to have overcome the difficulty in a simple and effective manner.

Fig. 1 is a part-sectional side elevation, and fig. 2 a part-sectional end elevation of a prepayment-meter mechanism constructed in accordance with the invention.

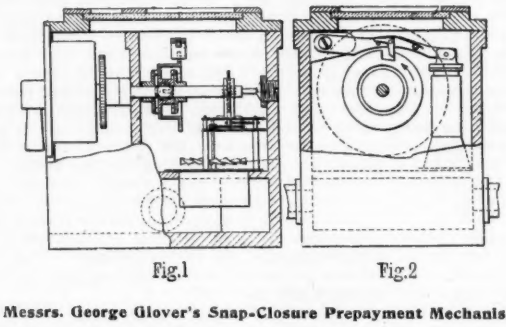


Fig.1 Fig.2

Messrs. George Glover's Snap-Closure Prepayment Mechanism.

One end of the gas outlet pipe is adapted to serve as a valve seating, and above this is arranged a disc-type valve hinged on the free end of a lever; the valve being raised from, or lowered on to, its seating by appropriate movements of the latter. The lever is made relatively long, is hinged at the end opposite the valve, and is arranged to extend over the periphery of an annular actuating disc. At its centre the disc is provided with a radially disposed pinion which engages a pair of independent coaxially arranged crown or bevel wheels, respectively connected to the coin-actuated mechanism and the gas-actuated mechanism. In its periphery this disc is formed with a notch, preferably of rectangular shape; and on the lever is pivoted a projection or pawl which can fall into the notch or ride on the periphery of the disc, and is under the control of a spring attached to the lever. The coin-actuated mechanism is of any convenient form (the patentees prefer that described in specification No. 145,165) and is operated by an external handle. The gas-operated mechanism is preferably of the type in which a gas-driven fan or rotor is used.

In action, the valve is opened by rotation of the disc under the action of the coin-operated mechanism in the direction of the arrow shown in fig. 2. The first effect is to cause one side of the notch in the disc to abut against the pawl. The pressure on the pawl causes it to rock against its spring. As soon as the pawl has moved sufficiently far under the action of the disc, the interaction of disc and pawl causes the lever to rise suddenly and open the valve. The disc then passes beneath the pawl and holds the valve open. The quantity of gas delivered depends on the amount of rotary or angular movement imparted by the coin to the disc. When the usual gas-cock is opened, and gas flows through the apparatus, the gas-actuated mechanism produces a reverse movement of the disc; but the valve always remains fully open until the disc notch comes beneath the pawl. The latter then falls into the notch, and the valve is suddenly and completely closed.

The mechanism is contained in a suitable case; and any convenient provision is made for connecting it to the gas supply service and the apparatus with which the meter is to be used.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 1.]

Nos. 18,836 to 19 412.

Bäumert, P.—"Gas-heated smelting-furnaces." No. 19,266.
Davis, H. H.—"Cleaning gas." No. 19,399.
Hodgson, J. L.—"Pitot tubes and orifices." No. 19,337.
Hooton, A. J. S —See Davis, H. H. No. 19,399.
Johnson & Co, Ltd, S. H.—See Davis H. H. No. 19,399.
Jones, F. W. Salisbury-.—"Distillation of coal." No. 18,899.
Klötzer, M —"Extracting tars and gases from bitumen-containing materials." No. 18,947.
Luke, E. E.—"Boiler for gas-stove." No. 19,226.
Pell, W. G.—"Retort apparatus for treatment of shale, coal, &c." No. 19,016.
Schmied, W.—"Device for cooling gases, &c., during condensation." No. 19 170.
Sulzer Bros., Ltd.—"Apparatus for cooling incandescent coke." No. 18,896
Sutcliffe, E. R —"Distillation of carbonaceous substances." No. 19,121.
Weyman, J. E —"Atmospheric burners." No. 18,946.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Chesterfield Corporation Bill: Read the third time, with the amendments, passed, and returned to the Commons.

Torquay Corporation Bill: Read the third time, with the amendments, passed and returned to the Commons.

Chesterfield Corporation Bill and Torquay Corporation Bill: Returned from the Commons, with the amendments, agreed to.

Macclesfield Corporation Bill: Commons amendments considered, and agreed to.

Smoke Abatement Bill: House to be in Committee on Tuesday, Nov. 20.

Gas Regulation Act.

On the motion of the Earl of Clarendon, it was agreed that the following draft Special Orders proposed to be made by the Board of Trade under section 10 of the Gas Regulation Act, 1920, be approved: Bromsgrove Gas Light and Coke Company; Horncastle Urban District Council; Whitchurch (Salop) Gas Company, Ltd.; Wrexham Gas Company; Derby Gas Light and Coke Company.

In the Commons, on the proposition of Viscount Wolmer, a similar motion was agreed to.

The Barnsley Special Order was approved, subject to the modifications and additions already indicated (*ante*, p. 369).

Smoke Abatement (Scotland) Bill.

A Bill to amend the law relating to smoke nuisances in Scotland, and for other purposes connected therewith, was presented on Aug. 1, by Viscount Novar, read the first time, and ordered to be printed.

Bills Royal Assented.

The following Bills received the Royal Assent: Birkenhead Corporation Bill; South Staffordshire Mond Gas Bill; Swanage Gas and Electricity Bill; Lytham St. Anne's Corporation Bill; Chesterfield Corporation; Torquay Corporation; Macclesfield Corporation; Barnsley Corporation.

HOUSE OF COMMONS.

Macclesfield Corporation Bill: Read the third time, and passed, with amendments.

Chesterfield Corporation Bill: Lords amendments considered, and agreed to.

Torquay Corporation Bill: Lords amendments considered, and agreed to.

Yarm Gas Supply.—It was reported to the Stockton-on-Tees Corporation on July 31 that application had been received from the Directors of the Yarm Gas Company for a supply of gas in bulk from the Corporation gas-works, pending the transfer of the Yarm undertaking, which the Council have purchased. The necessary connections have been made.

Spalding Extension Works.—An uncompromising attitude, both in relation to the Ministry of Health and certain of their own members, has been taken-up by the Spalding Urban District Council, relative to the extension of the gas-works by the addition of a carburetted water-gas plant, the cost of which is to be defrayed out of revenue. The Ministry had forwarded a communication, which was read at the last meeting of the Council, enclosing a petition that had been sent to them by six members of the Council, who had asked that an expert should be sent to the town to report as to the proposed extension. The Ministry declined to send down an inspector, and informed the Council that the proper course to follow, when it was intended to spread capital expenditure over a period of years (which the Council proposed to do, by arrangement with the contractor), was to apply for sanction for a loan. The Ministry assumed that this course would be adopted before the contract was entered into; but the Council determined to ignore both the petition and the Ministry's letter.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" with regard to applications to the Board of Trade for Orders under the Gas Regulation Act.

DECLARATIONS OF CALORIFIC POWER.

Doncaster Corporation.—470 B.Th.U. (Sept. 1.)
Godstone District Gas Company, Ltd.—450 B.Th.U. (Aug. 31.)
Hebden Bridge and Mytholmroyd Gas Board. — 450 B.Th.U. (Sept. 1.)
Horsham Gas Company, Ltd.—450 B.Th.U. (Sept. 1.)
Mountain Ash Urban District Council.—500 B.Th.U. (Aug. 21.)
Stockton-on-Tees Corporation.—500 B.Th.U. (Sept. 1.)

GAS REGULATION ACT ORDERS.

Copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act have been received from the Director of Gas Administration.

Bungay Gas Undertaking.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 21d. per therm. (Aug. 1.)

Godstone District Gas Company, Ltd.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 20d. per therm; and this price shall be substituted for the price of 5s. per 1000 c.ft. wherever it is mentioned in section 18 (price of gas) of the Godstone District Gas Order, 1891.

After the declared date, the word "therm" shall be substituted for "1000 c.ft." in paragraph (ii.) of Schedule B to the Godstone District Gas Order, 1891; and the words "fifth of a penny" shall be substituted for "penny" wherever it occurs in that paragraph. (July 27.)

Newquay (Cornwall) Gas Company, Ltd.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 14·4d. per therm; and this price shall be substituted for the price of 6s. per 1000 c.ft. wherever it is mentioned in section 25 (price of gas) of the Newquay (Cornwall) Gas Order, 1894.

After the declared date, the word "therm" shall be substituted for "1000 c.ft." in paragraph (ii.) of Schedule B to the Newquay (Cornwall) Gas Order, 1894; and the words "fifth of a penny" shall be substituted for "penny" wherever it occurs in that paragraph. (July 30.)

St. Ives (Cornwall) Corporation.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 18d. per therm.

After the declared date, the price of 14·4d. per therm shall be substituted for the price of 4s. per 1000 c.ft. mentioned in Article XXVII. of the St. Ives (Cornwall) Gas Order, 1895.

After the declared date, the price of 18d. per therm shall be substituted for the price of 5s. 6d. per 1000 c.ft. mentioned in Article XXIX. of the St. Ives (Cornwall) Gas Order, 1895. (July 27.)

Scunthorpe and Frodingham Urban District Council.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 15d. per therm; and this price shall be substituted for the price of 4s. per 1000 c.ft. mentioned in section 9 (limiting price of gas) of the Scunthorpe Urban District Gas and Water Act, 1899, and in paragraph (3) (*a*) of Article 1 (extension of gas limits) of the Scunthorpe Order, 1913.

After the declared date, "1·6d. per therm" shall be substituted for "8d. per 1000 c.ft." in paragraph (3) (*b*); and "0·8d. per therm" shall be substituted for "4d. per 1000 c.ft." in paragraph (3) (*c*) of Article 1 of the Scunthorpe Order, 1913. (Aug. 1.)

Swadlincote District Urban District Council.

After the declared date, the maximum prices in respect of gas supplied by the undertakers shall be 16·8d. and 18d. per therm; and these prices respectively shall be substituted for the prices of 4s. 6d. and 5s. per 1000 c.ft. mentioned in section 28 (limiting the price of gas) of the Swadlincote District Gas Act, 1897. (Aug. 1.)

Tenterden and District Gas Company.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 16 2d. per therm; and this price shall be substituted for the maximum price per 1000 c.ft. mentioned in section 19 (price of gas) of the Tenterden and District Gas Order, 1908, and as varied by the Order of the Board of Trade dated Nov. 29, 1917, made under the provisions of sub-section (2) of that section.

After the declared date, "therm" shall be substituted for "1000 c.ft." in paragraph (2) of schedule B to the Tenterden and District Gas Order, 1908; and "fifth of a penny" shall be substituted for "penny" wherever it occurs in that paragraph. (Aug. 1.)

Thirsk Gas Company.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 16·6d. per therm.

Prepayment-meter clauses are included. (July 30.)

Wokingham Corporation.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 15d. per therm.

After the declared date, the price of 9d. per therm shall be substituted for the price of 3s. per 1000 c.ft. mentioned in Article XXVII. of the Wokingham Gas Order, 1894.

After the declared date, the price of 15d. per therm shall be substituted for the price of 5s. 6d. per 1000 c.ft. mentioned in Article XXIX. of the Wokingham Gas Order, 1894. (July 27.)

NEWBURY CORPORATION (GAS) ORDER.

An Order which the Board of Trade propose to make under section 10 of the Gas Regulation Act, in favour of the Newbury Corporation gas undertaking, and the principal purpose of which is to extend the limits for gas supply beyond the Borough boundary, was the subject of an inquiry by Mr. H. C. HONEY (Director of Gas Administration) at the offices of the Board of Trade last Wednesday week.

There were numerous objections deposited; but there were appearances in respect of only three of them—namely, the Greenham Parish Council (represented by Mr. CHARLES DALBY, the Chairman of the Council), and the Newbury Racecourse Company and Mr. Lloyd H. Baxendale (both of Greenham, and both represented by Mr. ALFRED HILDESLEY). Objections by the Berkshire County Council and the Great Western Railway Company were withdrawn, on the insertion of agreed protection clauses which have been submitted to the Board. These clauses refer to the laying of pipes on main roads in the case of the Berkshire County Council, and to the laying of mains on the Company's property in the case of the Railway Company; and they follow the usual form.

Mr. S. WIDDICOMBE (Town Clerk of Newbury) explained the objects of the draft Order. The existing limits of supply, he said, were defined as the Borough; and it was proposed to extend these limits to include the parishes of Enborne, Greenham, Sandleford, Speen, and Shaw-cum-Donnington, in the County of Berks, the Parish of Newtown, in the County of Southampton, and portions of the parishes of Cold Ash and Thatcham, in the County of Berks. It was provided also that the Corporation may continue, maintain, and use any mains, pipes, and other works belonging to them at the date of the Order, within the limits of supply, as if they had been laid or constructed under the powers of the Order; and the provisions of the Order and the Acts incorporated with it shall apply thereto. The price to be charged for gas in the new areas was not to exceed by more than 1·6d. per therm that charged within the borough; but it was provided that the Corporation should not be entitled to charge a higher price in those parishes, in respect of premises already supplied at the date of the Order, than the price charged within the borough. [The maximum price which the Corporation may charge under the Newbury Gas (Charges) Order, 1922, is 1s. 6d. per therm, and the declared calorific value is 500 B.Th.U. The present actual price is 1s. per therm, less ½d. per therm discount for prompt payment.] Another clause to which attention was drawn was one providing that any local authority, company, or person may apply for powers to provide a supply in the added areas, and for the repeal of the powers of the Corporation, if the latter fail to lay mains in five years. The draft Order provides that the charge for hire of prepayment meters and fittings shall be calculated according to the number of therms supplied; the maximum charge to be 2·4d. per therm if cooking stove is included, or 2d. per therm if not included. The maximum rate for the hire of prepayment meters without fittings is to be 1·2d., or 10 p.ct. per annum on the cost of the meter, whichever is the higher. There follows a number of usual clauses relating to the supply of fittings, anti-fluctuators with gas-engines, provision of valves where high-pressure air is used, cutting-off of supplies, power to refuse supply to persons in debt for other premises, stand-by supply, notice to discontinue supply, power to contract for supply and purchase in bulk, &c. There is also a clause relating to the application of revenue and deficiency of receipts, providing that any balance of revenue which is not required for carrying on the undertaking shall be carried to the district fund, and any deficiency of revenue shall be defrayed out of this fund.

Dealing with the objections, Mr. Widdicombe said there was one from the Newbury Rural District Council. This stated that certain villages were already within the Corporation's limits of supply; but this was incorrect. He explained that before the Gas Regulation Act was passed, legal powers could not be obtained to supply outside the borough without Parliamentary authority, which would have involved considerable cost. Supplies had, however, been given from time to time by the Corporation to parishes outside the borough—in fact, to all the parishes to be included in the limits of supply under this Order, with the exception of Newtown and Cold Ash—and the number of outside consumers at present supplied was 234; the consumption by them during the past financial year having exceeded 7,000,000 c.ft. These supplies had been given with the knowledge and consent of the local authorities concerned. The Newbury Rural District Council's objection also regarded the Corporation's intention as one likely to lead to others detrimental to the interests of the Rural District Council. The Corporation, said Mr. Widdicombe, had had no definition of that objection, but it appeared from the newspaper reports of the proceedings of the Rural District Council that it was feared that the Corporation might apply for a Provisional Order for the extension of the borough boundary. Evidence would be given, however, by those who had been present at meetings of the Gas Committee and of the Corporation, at which the present draft Order had been considered, to the effect that no mention had been made at any such meeting of any proposed extension of the Borough. The next objection was by the Greenham Parish Council, and related to the powers which the granting of the Order would enable the Corporation to exercise over the roads in the parish. Mr. Widdicombe pointed out, however, that the draft Order incorporated the Gas-Works (Clauses) Acts of 1847 and 1871, which gave ample protection in regard to the breaking-up of roads for the laying or repair of gas-mains. He referred specifically to sections 8, 10, 11, and 12 of the Act of 1847, which referred to the carrying-out of works under the supervision of the highway authority rity, and the power of the latter to repair the roads if the work was not carried out satisfactorily by the gas undertakers. The Parish Council also objected to the power to charge a higher price to new consumers in the parish than to existing consumers, and also to the extension of limits, as being unnecessary, as the existing gas mains and pipes were sufficient to supply all in the parish who so desired. If the last statement were correct, said Mr. Widdicombe, there was not much to be feared with regard to the increased price.

Mr. HILDESLEY said that if an extension were unlikely, then his

own objection lost its force, but if an extension were probable, then his objection gained.

Mr. WIDDICOMBE stated that at this stage it was impossible to say whether or not there would be extensions. As to price, in view of the additional cost of mains in outlying districts, the Corporation contended that the powers sought were reasonable. It might be true that the extension of the limits was unnecessary in so far as the laying of further mains was concerned; but the point of the Order was to give the Corporation legal power to supply in the parish.

Mr. HONEY asked whether the Corporation were not also proposing, with regard to the present mains, that if they connected up a new consumer with them they would charge him a higher price than they were charging his neighbour, who was an old consumer.

Mr. WIDDICOMBE agreed that they would be entitled to do that.

Mr. HONEY said he took it that this was the point of the objection.

Mr. WIDDICOMBE referred to a letter from the Clerk of the Parish Council, in which it was said that all persons wanting gas were at present supplied, and the only practical effect of the Order would be that, whereas at present the Corporation must obtain the consent of the highway authority to open up roads outside the borough, the granting of the Order would enable them without consent to exercise extensive powers in regard to such roads. The Corporation had not a good reputation as a road authority; and it was feared that, if granted, the extended power would be detrimental to the parishioners. After again calling attention to the Gas-Works (Clauses) Acts, Mr. Widdicombe pointed out that the powers concerned would not be exercised by the Corporation as the highway authority, but by the gas undertaking; and the work would be carried out under the supervision of the Gas Engineer.

Mr. HONEY: And to the satisfaction of the highway authority?

Mr. WIDDICOMBE: Yes.

The objection of the Newbury Racecourse Company was next dealt with. This also referred to the powers which would be conferred upon the Corporation in connection with roads outside the borough, which were essential for use by traffic to and from the racecourse. It was contended that the exercise of those powers by the Corporation without the consent of the present authority might seriously prejudice the Company's business.

Mr. WIDDICOMBE reiterated his previous arguments in this connection, and pointed out that no complaints had been made by the Company up to the present with regard to interference with their traffic. Every effort would be made, he said, to see that the execution of necessary works would not interfere with traffic at the time of a race meeting. The Corporation had every wish that no avoidable interference should occur. Also, it was stated that the proposed extension was unnecessary; but Mr. Widdicombe applied the same arguments as before in this connection. Reference was made in the objection to the arbitrary methods adopted by the Corporation, as illustrated by the fact that they had applied for an Order without consultation with any of the public bodies affected. His reply to this was that the Corporation had been willing to give any information sought, and had followed the procedure laid down by the special rules of the Board of Trade. Two other objections were by the Shaw-cum-Donnington Parish Council and by Mr. Lloyd H. Baxendale (who lived, and owned property, in Greenham); but the points raised in these were on the same lines as in the others. Mr. Widdicombe repeated that the Corporation simply asked for statutory power to supply in these areas, to legalize their position.

Evidence was then given on behalf of the Corporation.

Alderman *Charles Lucas* (Chairman of the Corporation Gas Committee) said he had been a member of that body for over forty years, and Chairman for more than thirty years. He was a member of the Corporation when they purchased the gas undertaking from the Newbury Gas Light and Coke Company, under the powers contained in the Public Health Act, 1875, and the Newbury Borough Extension Act, 1878. At the time of the purchase, gas was not supplied outside the Borough of Newbury; but from time to time the Corporation had received applications for a supply to premises outside. Until the Gas Regulation Act, 1920, became operative, legal authority to supply premises outside the borough could not be obtained except by Act of Parliament. As the promotion of a Bill for this purpose would have involved considerable expense, the Corporation had not taken steps to this end, though in many cases they had laid pipes for giving supplies of gas to premises outside the Borough. In October, 1922, the Corporation had received an application from Messrs. Edgerley and Seales for a supply of gas to premises in the parish of Shaw-cum-Donnington; and in the application it was stated that between 75 and 100 lights would probably be required. The Gas Committee had considered the application, and had received a report from the Gas Engineer that, in order to give a sufficient supply, it would be necessary to lay a new main at a heavy cost. The Committee, for financial and other reasons, had decided not to recommend the Corporation to lay a main for the purpose of giving the suggested supply; but the position with regard to supplies of gas outside the borough was considered, and it was decided that steps should be taken to apply to the Board of Trade for a Special Order under section 10 of the Gas Regulation Act, with a view to the Corporation's limits for the supply of gas being extended to areas outside the borough, and for other provisions which would facilitate the better administration of the gas undertaking. The draft of such an Order was subsequently prepared, and was approved by the Gas Committee and by the Council. No portion of the area within the proposed extended limits of supply was supplied with gas by any other gas undertaking; in fact, there was no other undertaking which could give a supply.

At no meeting of the Committee or the Council at which the provisions of the proposed Order were discussed, said witness, was any mention made of an extension of the boundaries of the municipal borough; and in applying for the proposed Order, the Gas Committee and the Corporation had had no object in view other than to facilitate the supply of gas. The Newbury Corporation had every wish to work amicably with neighbouring authorities; and, in exercising any power granted by the Order, would endeavour to comply with the reasonable requests of any such body.

Mr. HILDESLEY, cross-examining on behalf of the Racecourse Company and Mr. Baxendale, said that as the Corporation had worked amicably with the consumers and local authorities at present supplied beyond the borough limits, and as the Corporation were willing to continue to supply gas to consumers outside, it was a little difficult to see why these extended powers were sought.

Witness replied that the Corporation wanted to be in a proper legal position to supply gas, and to be able to recover rentals, &c. There were 14 ordinary and 72 prepayment consumers in Greenham; and he would not accept the proposition that there was not likely to be development such as would call for a further supply of gas except at the Newbury end.

Mr. HILDESLEY said the administration of the roads by the Corporation within the borough was not such as to inspire confidence in outside areas if the Corporation obtained the powers they sought. This was really a preliminary to the extension of the borough; and if the borough were to be extended to include Greenham, they would become the road authority, which would be undesirable.

Mr. WIDDICOMBE replied that if the Order were passed, the breaking-up of roads would be carried out under the supervision of, and to the satisfaction of, the highway authority.

Mr. *W. R. Davey* (Engineer and Manager of the Newbury Borough Gas Undertaking) then gave evidence. He had held the appointment since January, 1898, at which time supplies of gas were given by the Corporation to premises outside the borough. Subsequently pipes had been laid for giving supplies of gas to other premises outside the borough. In every such case he had communicated with the Berks County Surveyor or the Highway Surveyor of the Newbury Rural District Council, as the case required, and had carried out the work of laying the pipes with their knowledge and consent. In practically every case the works were inspected by the surveyor concerned, and any request made by the surveyor was complied with. No complaint with regard to the laying or repairing of any pipes had, to his knowledge, been made by or on behalf of any parish council. By arrangement with the Parish Councils of Speen and Shaw-cum-Donnington, supplies of gas had been, and were being, given for the purpose of lighting public lamps in these parishes; and the Newbury Rural District Council had recently given consent for the supply of gas to a number of houses erected by the Council in the Parish of Shaw-cum-Donnington. An application for the supply of gas for lighting public lamps in the Parish of Greenham had been received some years ago, but the matter had fallen through for financial reasons. No complaint had ever, to his knowledge, been made by the Newbury Racecourse Company that any works carried out by the gas undertaking had interfered with traffic to or from the racecourse.

Asked by Mr. HILDESLEY whether there was a likelihood of a supply being wanted in the rural part of Greenham, witness said he did not think there would be very much more gas needed there. He agreed that, so far as the people living in the parish were concerned, there would be no practical difference whether the Order were granted or not.

In reply to Mr. HONEY, witness said that electricity was supplied in the borough by the Urban Electricity Supply Company. Asked how often the gas undertaking broke-up the roads in Greenham, witness said he did not think they had had to open the roads for over fifteen years. The mains were generally laid on the side of the road, about 2½ or 3 ft. from the kerb.

Mr. DALBY, cross-examining on behalf of the Parish Council of Greenham, said that the majority of the houses in the urban part of Greenham were supplied from mains laid in the borough.

Witness agreed that some houses were supplied from a main in a road under the jurisdiction of the Corporation. The boundary between the borough and the parish ran under the fences of the houses, so that the mains were in Newbury and the consumers in Greenham. As to public lighting in Greenham, the scheme was rejected by the Parish Council because the price was prohibitive.

Mr. *R. H. Jeeves* (Borough Accountant) gave evidence as to the number of consumers outside the Borough, and the gas consumed by them, as already stated. He handed in a statement of the number of consumers and the quantity of gas consumed in each parish, and another showing the gas consumed by the Racecourse Company for the year ended March 31 last, which amounted to 656,200 c.ft., at a cost of £198 8s. 9d. There were moneys due to the Corporation for gas supplied outside the borough, which had been outstanding for some considerable time. The Corporation had no claim in respect of these moneys.

Replying to Mr. HILDESLEY, witness said he had had no difficulty in getting money due from Greenham.

This closed the case for the promoters.

Mr. HILDESLEY, addressing Mr. Honey, pointed out that neither Mr. Baxendale nor the Racecourse Company minded whether they were supplied with gas or not, but both objected to the limits of the undertaking being extended to include their property. He suggested some modification of the limits, which would exclude the rural part of Greenham that contained their property. There was no ground for the inclusion of Greenham, except that the gas undertaking wished to legalize their position. There had never been the slightest dispute between the gas undertaking and his clients; and he submitted that the Corporation had not made out a case. The only advantage to the Corporation as the result of obtaining the Order was that they would be able to claim payment of accounts due. His clients were not the sort of people to refuse to pay their bills; and, of the 2500 acres comprising the Parish of Greenham, they held 2000.

Mr. HONEY said the gas undertaking would have no power to enter upon private property in any case.

Mr. HILDESLEY pointed out that, if a main existed when the Order came into force, it became a main laid under the terms of the Order. The Order stated that the Corporation could continue, maintain, and use any mains, pipes, and other works belonging to them at the date of the Order within the limits of supply; and the provisions of the Order and the Acts incorporated therewith would apply to those mains, pipes, and works as if they had been laid down or constructed under the authority of the Order.

Mr. HONEY said that if it had that effect, then it would have to be altered.

Mr. HILDESLEY, replying to a question by Mr. Widdicombe, said that, so long as his clients were under a private agreement, they could tell the gas undertakers to take the main away if no more gas was required, but, once the Order was passed, the Corporation could insist on leaving the main there for ever.

Mr. WIDDICOMBE maintained that the sub-section referred to did not interfere with the ownership of any main.

Mr. HILDESLEY, continuing, said that with regard to the extra charge to new consumers, the only justification would be the cost of connecting the supply. If, however, there was a main existing, it was difficult to see how this could be justified.

Mr. *Dalby* (Chairman of the Greenham Parish Council) stated that those parishes which were still outside Newbury dreaded further powers being conferred upon the Corporation. There was enough gas in Greenham to meet all demands; and, this being the case, he failed to see the need for further powers. He had a number of letters from people in the parish, all protesting against the granting of such powers to the Corporation.

Mr. HONEY said he thought it was pretty clear that, where the Corporation were supplying gas at the present time, their position ought to be regularized. No one could expect them to take up their mains and discontinue the supply. There was nothing, however, in the part of the Parish of Greenham, other than the urban part, that was of any use to the Corporation from the point of view of gas supply. So far as one could judge, he did not think it likely that they could extend very much; but, supposing the Corporation were confined to the very small part of the parish in which they were at present supplying, was not that likely to be a very much stronger argument in favour of extending the borough boundary to include that urban part of the parish than if they were to include the whole parish in the gas limits?

Mr. HILDESLEY said one could understand that, if the borough wanted to extend, the one thing they really wanted was the rateable value of the Racecourse Company; but the Company, naturally, would prefer to be left outside the borough. He asked that Greenham should not be included in the gas limits.

Mr. HONEY stated that he would be prepared, so far as Greenham was concerned, to recommend the Department to confine the power of the Corporation to what one might call the urban part of the parish, which included the district at present supplied. A clause could be drawn up enabling the Corporation to continue to supply by agreement to Mr. Baxendale and the Racecourse Company, notwithstanding that they might be outside the limits set out in the Order. With regard to the price of gas in Greenham, he saw no reason, considering that the mains were already there, why the Corporation should not supply at the same price as in Newbury.

Mr. WIDDICOMBE pointed out that the mains had cost more money than mains inside the existing area.

Mr. HONEY agreed to recommend a differential price for an area outside the borough, and outside a circle drawn 1¾ miles from the gas-works.

This concluded the hearing.

STOCKPORT GAS-WORKS PROFIT.

The report of the Engineer (Mr. S. Meunier) to the Gas Committee of the Stockport Corporation for the year ended March 31, which was presented by Sir Thomas Rowbotham (Chairman of the Committee) to the Town Council a week last Wednesday and accepted unanimously and with gratifying cordiality, shows a satisfactory increase of 24,212,000 c.ft. in gas consumption.

The chief causes which have led to these gratifying results, states Mr. Meunier, were the continued good working of the new carbonizing plant, whereby the quantity of coal dealt with was lowered by about 20,000 tons over the average of recent years, and reductions in the expenditure on coal. There was a further saving due to the diminished use of the carburetted water gas plant, thereby reducing the quantity of oil required and increasing the coke available for sale. The reduction on this item is £19,000. The revenue for tar shows an increase of £7307; market values throughout the year having steadily advanced, so that the losses on coke and ammoniacal liquor have been nearly balanced. Maintenance of works items are down by approximately £8000. Distribution, on the other hand, is increased by £1197, which is accounted for by the greater amount of repairs to mains and services. The gross profits thus amount to £63,678, equal to 22·02 p.ct. on outstanding capital. From this is required £11,090 for interest, £20,447 for redemption of loans, and £538 for stock redemption, leaving £31,603 net profit.

Sir Thomas Rowbotham, in moving the adoption of the report, complimented its author upon its lucidity and conciseness, and expressed the hope that with fair coal prices the Committee would be able to wipe off the remaining adverse balance of £19,000 at the end of the current year.

New Joint-Stock Company.—A Company has been registered under the title of the National Carbonized Fuel and Bye-Products Syndicate, Ltd., with a capital of £12,500, in £1 shares. The office is at No. 13, Arundel Street, W.C.

Extensions at Plymouth.—The Engineer's report and recommendations with regard to the extension of the works and plant were further considered at a recent meeting of the Plymouth Corporation Gas Committee. It was resolved that the report be adopted except so far as the recommendation to provide an additional gasholder was concerned, and that application be made to the Minister of Health for sanction to borrow £19,340. This sum will be expended in the erection of a carburetted water-gas plant, a purification plant, and the laying of a new main from the water-gas plant to a holder in the works. It was also resolved that application be made to the unemployed Grants Committee for a grant towards the interest on the loan of £19,340. The Engineer was asked to invite tenders for the renewal of four benches of retorts at an estimated cost of £6500. It is expected that the provision of the new plant will enable an annual saving of £7000 to be made.

STOKE-ON-TRENT GAS DEPARTMENT.

In the "JOURNAL" for July 25 [see p. 372] was published a table of general results for the year ended March 31. In presenting this comprehensive statement at a meeting of the Town Council on July 26, Mr. A. Mackay (Chief Engineer and General Manager) said the figures were somewhat unique on account of the developments which had taken place. The report stated that the Potteries station of the British Gas Light Company had been under the management of the County Borough of Stoke-on-Trent since July 1, 1922. With a view to bringing these works into line with the financial year of the Corporation, the results were for the nine months which had elapsed since the taking-over of the undertaking. There was a substantial credit balance—the result of putting the price of gas on a lower rate than had recently existed in the area supplied from the Hanley works. The work of carrying out the concentration scheme already approved by the Corporation had the sanction of the Ministry of Health in so far as coupling up the Stoke and Fenton works was concerned. Some of the work in connection with this had actually been started; and it was hoped that speedy progress might be made with a view to supplying these two areas at a cheaper rate.

The total gas manufactured at the five works for the year ended March 31 was 1,193,068,700 c.ft.; this total being made up as follows: Burslem, 247,141,000; Fenton, 149,374,000; Longton, 197,630,000; Stoke, 164,779,700; and Hanley, 434,144,000 c.ft. The results for the year, said Mr. Mackay, had been most satisfactory; and it was pleasing to report that the make of gas per ton of coal carbonized at the old works had increased from 13,622 to 14,129 c.ft. per ton—an additional 507 c.ft. The amount sold was also greater. While the make of gas per ton of coal carbonized at Hanley works had increased from 12,011 to 13,619 c.ft., the gas sold had risen from 10,435 to 11,784 c.ft. During the period under review, the residuals market had substantially improved. In so far as this market could be focussed at the present time, he believed the improvement might continue for some time. The results from each of the works, from the point of view of residuals, were most satisfactory.

The work in connection with the distributing section of the department, continued Mr. Mackay, was having special attention. It was within recollection that, some few years ago, the amount of gas unaccounted-for was high; but this had gradually decreased. On the four old works the average unaccounted-for was 9·42 p.ct. It would be noted that the gas unaccounted-for in the Hanley area was shown as 12·27 p.ct. As had already been mentioned, these figures were for a nine months period; and he was of opinion that the unaccounted-for gas on a year's working at the Hanley area would certainly not exceed that in the other areas of the borough. The department had also undertaken a scheme of re-laying a number of gas-mains. On account of the heavy street traffic it was advantageous to lay these mains considerably deeper. This work was still in progress. From the beginning of the current financial year, the gas consumers in the whole of the county borough of Stoke-on-Trent had been put on the same basis in so far as price and quality of gas were concerned; and at the same time the therm basis had been introduced. It had been arranged that the new method would not be dealt with in a complicated fashion.

Mr. C. H. Bowers (Chairman of the Gas Committee), moving the adoption of the report, said the accounts showed a net profit of £50,647. To those who were not in close touch with the working of the Committee, it might perhaps occur that there had been undue delay in lowering the price of gas. It was preferable, however, in the first place to put the finances on a sound basis. They proposed to deal with the balance by placing £10,647 to the credit of the reserve fund, and to carry £40,000 to the credit of the revenue account, as a working balance. He hoped that a reduction in the price of gas would be made in the near future. They were anxious to link up the Stoke and Fenton gas-works; all the evidence being that they could then effect a considerable saving in manufacture.

Referring to the report, the "Staffordshire Sentinel" "cordially congratulates all concerned, and in particular Mr. C. Bowers, Mr. A. Mackay, and Mr. T. Thompson (the Borough Treasurer). . . . Mr. Mackay was the moving spirit in the buying-out of the Company by the Corporation; and he is now guiding the Committee towards the practical amalgamation of the several stations, with concentration on the Hanley works as headquarters. . . . A perusal of the various documents included in the annual report inspires us with a renewed conviction of the soundness of Mr. Mackay's great ability, energy, experience, and earnest enthusiasm, and with a confident optimism that he will carry his scheme to the fullest success, to the immense advantage of the Potteries area, and with the most distinguished enhancement of his own professional and personal reputation."

The price of gas at Leigh (Lancs.) is to be reduced by 6d., making the charge 3s. 6d. per 1000 c.ft. During the last twelve months the price has been reduced by 2s.

The financial statement for the year ended March 31 shows a net loss of £913 on the Batley gas undertaking, as compared with an adverse balance in 1921-22 of £15,813.

The Directors of the Croydon Gas Company have declared dividends for the half-year ended June 30 at the following rates per cent. per annum: Sliding-scale stock, 6½; maximum dividend stock, 5; redeemable preference stock, 7½.

The price of gas in Perth is to be reduced by 4d. per 1000 c.ft. In the estimates of the Gas Department for the coming year, it is proposed to wipe-off a deficiency of the previous year amounting to £2782. The recently introduced vertical retorts have enabled this reduction to be made.

We learn from Mr. T. W. Smith (Manager and Secretary of the Whitworth Vale Gas Company), that as a result of a month's intensive "cooking campaign," during which Mr. R. Gamble Marks has delivered fourteen lectures, no less than a hundred orders have been received for new cookers, &c.

NATIONAL GAS EXHIBITION.

Preliminary List of Exhibitors.

The following is a list of the firms who have already arranged to take space at the National Gas Exhibition, to be held in Bingley Hall, Birmingham, from Sept. 17 to Oct. 3.

Automatic Sign Co., Ltd., 144, Clerkenwell Rd., London, E.C. 1.
Abbott, Birks, & Co., 113, Newington Causeway, London, S.E. 1.
British Uralite & Cellactite Works, Lincoln House, 296, High Holborn, W.C.
Bainbridge, H. W., & Co., Ltd., Grosvenor Bldgs., Steelhouse Ln., B'ham.
Breeden, Joseph, & Co., Ltd., Fazeley St., Birmingham.
Bryan-Donkin Co., Ltd., Chesterfield.
British Furnaces, Ltd., Derby Rd., Chesterfield.
Burners (1921) Ltd., Stoke Prior Works, Bromsgrove, Worcs.
British Commercial Gas Association, 30, Grosvenor Gdns., London, S.W. 1.
British Sulphate of Ammonia Federation, Ltd., 30, Grosvenor Gdns., S.W. 1.
City of Birmingham Gas Department, Council House, Birmingham.
Consett Iron Co., Consett, Co. Durham.
Coin Change Co., Ltd., 6, Lebanon Park, Twickenham, London.
Cannon Iron Foundries, Ltd., Deepfields, nr. Bilston.
Chemical Engineering & Wiltons Furnaces, Ltd., 76, Victoria St., S.W. 1.
Canning, W., & Co., Ltd., Great Hampton St., Birmingham.
Ewart & Son, Ltd., 346-350, Euston Rd., London, N.W. 1.
Evered & Co., Ltd., Surrey Works, Smethwick, Birmingham.
Forth & Clyde & Sunnyside Iron Co., Ltd., Falkirk, Scotland.
Falk, Stadelmann, & Co., Ltd., Lionel St., Birmingham.
Foster Instrument Co., Ltd., Letchworth, Herts.
Flavel, Sydney, & Co., Ltd., Imperial Works, Leamington.
Glover, Thos., & Co., Ltd., Angel Rd., Edmonton, London, N.
Gibbons (Dudley), Ltd., Dibdale Works, Dudley, Worcs.
General Gas Appliances, Ltd., Guide Bridge, Manchester.
Goodyear & Sons, Ltd., Churchfield Mills, Dudley, Worcs.
Hyde, Silas, 99, Snow Hill, Birmingham.
Holmes, W. C., & Co., Ltd., Huddersfield.
Howlett, M., & Co., Ltd., 140, Hockley Hill, Birmingham.
Hurry Water Heater Co., Ltd., Broad Street, Birmingham.
Horstmann Gear Co., Ltd., Newbridge Works, Bath.
Hands, G., & Co., 69-71, Farringdon Road, London, E.C. 1.
Innovation Gas Light Co., Mortlake, London, S.W. 14.
Jackson Boilers, Ltd., 83, Kirkstall Rd., Leeds.
Jones, H., Ltd., Albion St., Birmingham.
Midland Tar Distillers, Exchange Bldgs., Stephenson Place, Birmingham.
Mabbott & Co., Ltd., Poland St., Manchester.
Mountford, F. (Birmingham), Ltd., Moseley St., Birmingham.
Main, R. & A., Ltd., Angel Rd., Edmonton, London, N. 18.
Midland Gas and Water Fittings Co., 181, Aston Rd., Birmingham.
Mobberley and Perry, Ltd., Stourbridge.
National Gas Engine Co., Ltd., Ashton-under-Lyne.
New Inverted Incandescent Gas Lamp Co., 19-21, Farringdon Av., E.C.
Pneumatic Gas Lighting Co., 36, Farringdon St., London, E.C.
Parkinson Stove Co., Stechford, Birmingham.
Parkinson and Cowan, Ltd., Fitzalan St. Works, Kennington Rd., S.E.
Parkes, G. B., Ltd., Crown Works, Halesowen, Birmingham.
Rawplug Co., Ltd., Gloucester House, Cromwell Rd., S.W. 7.
Radiation Ltd., 18, Bennetts Hill, Birmingham.
  Arden Hill & Co., Ltd., Salford St., Birmingham.
  John Wright & Co., Ltd., Thimb'emill Lane, Aston, Birmingham.
  Wilsons and Mathiesons, Ltd., Armley, Leeds.
  Richmond Gas-Stove Co., Ltd., Warrington.
  Fletcher Russell & Co., Ltd., Warrington.
  Davis Gas-Stove Co., Ltd., Camberwell Rd., London, S.E.
Stead, C. F., & Co., Ltd., Sheepscar Tannery, Leeds.
South Staffordshire Mond Gas Co., Ltd., Dudley Port, Tipton, Staffs.
Sugg, Wm., & Co., Ltd., Ranelagh Wks., Chapter St., Westminster, S.W. 1.
Smith, J. & W. B., Ltd., 15/23, Farringdon Rd., London, E.C. 1.
Sutherland, A. G., Ltd., Warwick Rd., Greet, Birmingham.
Sutherland Meter Co., Ltd., Electric Avenue, Witton, Birmingham.
Stewarts & Lloyds, Ltd., Broad St. Chambers, Birmingham.
Stott, James, & Co., Ltd., Gas Engineers, Oldham.
Shell Mex, Ltd., Shell Corner, Kingsway, London, W.C. 2.
Staniforth, H., Broadway Works, Cricklewood Broadway, London, N.W. 2.
Thermal Syndicate, Ltd., 28, Victoria St., London, S.W. 1.
Taunton, J. & J., Ltd., Sherbourne Rd., Birmingham.
Turner, F., 61/63, Summer Hill Rd., Birmingham.
Thomas and Bishop, Ltd., 37, Tabernacle St., London, E.C. 2.
Wilson, Geo., Gas-Meters, Ltd., Foleshill Rd., Coventry.
Woodall, Duckham, and Jones, Ltd., 52, Grosvenor Gardens, London, S.W.
Wood, E. A., 100, Aston Rd., Birmingham.
Whitehouse, Wm., & Co., Ltd., Empire Works, Brueton St., Birmingham.
Welsbach Light Co., Ltd., Gray's Inn Rd., London, W.C.
Wright, Alexander, & Co., Ltd., 1, Westminster Palace Gardens, S.W. 1.

Birmingham Corporation Accounts.—We have received from Mr. J. R. Johnson, F.S.A.A. (Treasurer of the City), a copy of the Birmingham financial statement for the year ended March 31 last. The total revenue of the gas undertaking was £2,615,067; and the working expenses amounted to £2,421,631, leaving a gross profit of £193,436. The loan charges were £141,017; and consequently a net profit of £52,419 remained, all of which has been placed to the special expenditure account. The amount standing to credit of reserve fund at the end of the financial year was £78,280, as compared with a sum of £72,779 for the previous year. In the short space of five years the expenditure on capital account of the City of Birmingham has risen from £28,000,000 to over £35,000,000. The total revenue from all sources approximates £12,000,000 per annum.

Weymouth Consumers' Gas Company.—Very satisfactory working results are reported by the Directors of the Company for the six months ended June 30. The quantity of gas sold was 421,960 therms, equal to 91,730,400 c.ft. The latter figure compares with 90,582,200 c.ft. sold in the corresponding half of 1922. From April 1 last, the price charged for gas was 10·5d. per therm—only one-third above pre-war price. The rentals of gas appliances were reduced by 25 p.ct. Receipts from the sale of gas show an increase of £361; and there is a slight advance in the aggregate of other receipts. Expenditure being practically the same as last year, the increase in profit is £434. After providing for interest on the debenture stock, the balance at the credit of the net revenue account is £9975, out of which the payment of a dividend on the ordinary stock for the half-year at the maximum rate of 5 p.ct. per annum is recommended.

SALFORD CORPORATION GAS ACCOUNTS.

The annual report for the year ended March 31 is a record of a most successful year's working. At the commencement of the year there was an accumulated debt of £51,785 owing to the borough fund. The whole of this amount has been paid off, a contribution of £12,090 has been made to the borough fund in aid of rates, and a sum of £4766 has been placed to the reserve fund account. The gross profit for the year was £157,544.

The report, which is signed by Mr. F. S. Phillips, the Chairman of the Committee, states that the number of consumers has increased during the year. The sales of gas have, however, shown a decrease equal to 3·13 p.ct., due to the bad state of trade in the area of supply. The coal and cannel carbonized during the past year amounted to 125,050 tons, as compared with 127,920 tons for the previous year. The quantity of gas made was 1,725,713,000 c.ft. The total number of gas-cookers—ordinary and prepayment—on hire at March 31 was 19,373, and the total number of gas-fires was 4055; these figures showing a considerable increase as compared with last year. The receipts from the sales of tar and sulphate of ammonia are also higher than those of last year; but a decrease is recorded in the receipts from the sales of coke.

The expenditure during the year has been less than last year, owing to the lower costs of coal and other materials, and to the reductions in wages and bonuses. In view of these facts the Committee, after very careful consideration, felt that they were in a position to recommend the Council to reduce the price of gas from the March quarter by 8d. per 1000 c ft. to consumers by ordinary meters, and to increase the quantity supplied by prepayment meters from 18·29 c.ft. to 21·33 c.ft. per penny. These recommendations were approved by the Council. This reduction, together with the reduction of 6d. per 1000 c.ft. from the June quarter, 1922, makes a total reduction of 1s. 2d. in less than twelve months.

CO-PARTNERSHIP AT ALDERSHOT.

In spite of unfavourable weather, a highly successful annual meeting of the co-partnership and hospital and benevolent funds in connection with the Aldershot Gas, Water, and District Lighting Company was held last Saturday week at the Company's sports field, Ash Road, Aldershot. Among those present were the Chairman and Managing Director—Mr. R. W. Edwards—and Mrs. Edwards, Dr. F. Stroyan, J.P., and Mr. C. P. Crookenden (Directors), Mr. W. J. Smith (Secretary of the National Gas Council), Mr. W. A. Tookey, and several of the secretaries and managers of the gas, water, and electricity concerns in the neighbourhood.

The business meeting was presided over by Mr. R. W. Edwards, who said that their scheme appealed to the employee as a means of aiming at the economical expansion of the Company's business. Co-partnership had the advantage of installing the employee as a shareholder in the Company. Critics had suggested that this was not the most acceptable way of profit-sharing; but the fact that there was a decided inclination to supplement the money so invested, and that appreciable sums had been deposited in their savings bank, served to rebut the suggestion. In the Committee's report it would be seen that the savings two years ago had approached nearly £1500 per annum, and that during the past year they were over £900. All that was possible had been done to encourage the improvement—in education, training, and sport—of the workers. As to the hospital and benevolent fund, this was work done quietly and unselfishly. It neither invited applause nor sought notoriety. During the past winter a series of lectures on ambulance training had been given by a skilled teacher; and they were hopeful that as time went on a large proportion of their employees would be qualified for ambulance work. The sports club grew in strength year by year; and they hoped to see the facilities considerably extended during the coming year.

Following the business proceedings, one of the youngest lady members of the staff, on behalf of the co-partners and hospital fund subscribers, handed to Mrs. Edwards a bouquet of carnations.

Portsea Island Gas Light Company.

A striking illustration of the goodwill existing between the employees and the Directors and heads of departments was provided on the occasion of the recent annual outing to Hampton Court. Perhaps the main reason for the happy state of affairs generally is the keen interest displayed by the directorate and management in the well-being of the employees. The Company sets a fine example in this respect. Mr. T. H. F. Lapthorn, J.P. (Chairman of the Company), who was presented with a gold cigarette case, subscribed for by all the staff and employees of the Company, said he had been Chairman for the short period of four years, and that he should have succeeded in so short a time in gaining their confidence to the extent to which the presentation gave expression, was, he thought, one of the greatest honours and compliments he had ever received. That confidence it would ever be, while he retained his present position, his anxious desire to retain. Mr. T. Carmichael (Managing Engineer) expressed his appreciation of the good feeling which existed, and said he wished to acknowledge the loyal co-operation during the past twelve months. He was delighted to feel that they were all colleagues working together for the benefit of the Company.

Street Lighting at Budleigh Salterton.—The Budleigh Salterton Urban District Council, who are supplied with gas for public lamps at a charge of 1s. 3d. per 1000 c.ft. less than that to the general public, have refused an offer by the Gas Company to light the streets of Budleigh Salterton for a period of 3 or 5 years at a considerably less price than that required by the Company for a 1 year's contract. A provisional Order has been obtained by a local resident covering a supply of electricity to the town; and it is anticipated that street lighting will be cheaper by electricity than by gas.

PRIMITIVA GAS COMPANY OF BUENOS AIRES, LTD.

An Optimistic Statement.

The Twenty-Second Annual General Meeting of the Company was held at River Plate House, Finsbury Circus, E.C., on Tuesday of last week—Sir ALBERT E. BOWEN, Bart. (the Chairman), presiding.

The SECRETARY (Mr. J. M. Macmorran) read the notice convening the meeting; and the certificate of the Auditors, the Directors' report, and the statement of accounts were taken as read.

The CHAIRMAN, in moving their adoption, remarked that on this occasion they were late with their annual meeting: but the reason was conveyed to the shareholders in a circular last February, which informed them that he was about to proceed to Buenos Aires to look into the affairs of the Company and to make a complete investigation, and that on his return he would report fully. He left England on March 9, and returned on June 25; and he could now tell them the result of his inquiries. Every possible misfortune seemed to have come to the Company—and this notwithstanding the undoubted fact that every effort, both in London and Buenos Aires, had been made to improve the position. The conditions as he outlined them at the last meeting had not altered materially. They were at last making gas in the orthodox manner, from best British and American coals, and were steadily carrying out door-to-door propaganda, and doing everything possible to attract new consumers and get back old customers. Complaints were few and far between; and when they could persuade people back to the gas habit, the latter were satisfied with the Company's product and their treatment. It was all, however, a very slow and uphill process.

REVENUE AND MANUFACTURING CAPACITY.

The shareholders could see at once the cause of the very poor profit and loss result, if they would turn to the revenue account, which was given at the request of some shareholders. A gas revenue of only £426,405 was totally inadequate to provide a reasonable profit on the very large capital of the Company; but, as he had explained before, they were fully equipped for at least three times the business they were able to do last year; and it must be remembered that it was not their fault that they were so equipped, as in 1913 they ran their three works almost to capacity, and made a profit of £340,000. They had no competition in the gas business in the great city of Buenos Aires; and though they had to recognize that they had little hope of ever recovering the lighting business, which the electric companies took from them during the war, when the Company could not supply gas of reasonable quality, they were sure that gas could, and would, compete with electricity for cooking, heating, and power. Hence the Directors still hoped that they would recover their old position and profits. He might say, in this connection, that during one of the several cordial interviews he had with the President of the Republic, the President told him that he was interested in seeing at least a part of the city lighted by gas, and that he had spoken to the Lord Mayor about it. This was confirmed by Mr. Noel, the Intendente; and instructions were received by the Company to light the avenue in which the President's house was situated with up-to-date gas lighting. The installation was completed and working; and he had hopes that this might lead to a considerable contract with the Municipality for lighting at any rate the outskirts of the city. Larger output was their most urgent necessity, to reduce the incidence of the overhead charges.

THE INVESTIGATION.

As to what he did and what he found out in Buenos Aires. He went down (without any expense whatever to the Company), and proceeded to make a thorough investigation of the conditions; but he felt that he personally was not able to tackle the technicalities, though he had been connected with this Company and its predecessors for forty years. Therefore he enlisted the services of the best gas man he knew—one who was thoroughly acquainted with the conditions in Buenos Aires, who was highly respected by some of the most eminent gas engineers in England (including their Vice-Chairman), and, further, who was as straight as a die, and on whose report he (the Chairman) could thoroughly rely. He purposely arranged for this gentleman to arrive in Buenos Aires only a few days before he himself left, so as to conduct his investigations without any lead from him. All he (the Chairman) did was to give instructions that everything was to be open to him—he was to have a free hand to see and examine each and every detail of the business. He received this gentleman's report on July 7. The shareholders were entitled to see it, if they wished to do so; and it was at their disposal at the office. The Board at once came to the conclusion that changes must be made in the management at Buenos Aires. New blood was required, principally because their officers there had got into a groove, had become so overwhelmed by misfortunes—had been so "rattled," if he might use such a word—that, in the interests of the Company, it was absolutely necessary to make a thorough change. The Directors had begun to do this. The time had been so short since the report was received, that the whole of the programme the Board had adopted had not been definitely concluded; but daily it was being advanced, and he had no doubt that within the next fortnight they would have finished the re-arrangement. He did not want to say too much that day, because certain negotiations were going on which might be jeopardized by premature publicity. He would only state that they had found it necessary to strengthen the Local Board and change the management and several of the higher officials. In good time they would let the shareholders know exactly what had been done. He was aware of the old saying about "not swopping horses when crossing the stream;" but in this case salvation was only to be obtained by making a thorough re-arrangement of the Buenos Aires *personnel*. As he had said, he had been connected with the Gas Companies for forty years; and this was by far the most disagreeable job he had had to do for them. He only wished he could go with the old crowd; but he had made up his mind to pull this once splendid Company back to prosperity; and unless it was the wish of the shareholders that he should make way for a younger man, he meant to do it. He thought he was still one of the largest shareholders; and he was as sure as he had ever been that the Company would eventually come back to prosperity. But if the shareholders were of opinion that anybody else could do the job better than he could, he should be delighted to let him have a try.

THE CORNER TURNED.

They would no doubt have noticed a paragraph in the report to the effect that the Board had confidence that the Company had now turned the corner, and that better results might be hoped for in the future. The principal reason of the Directors for saying this was that during the first three months of this year they sold 25 p.ct. more gas than in the corresponding three months of 1922; while up to date the increased consumption was about 17 p.ct. And it must be remembered that this increase was in the face of the fact that they were giving very much better gas, so that less gas was used by customers than when they were giving them the poor stuff it was possible to make out of wood, bran, &c. Of course, the fact that they had been able considerably to reduce the selling price, owing to cheaper coal and materials, had been a determining factor, as it was now considerably cheaper to use gas in Buenos Aires than electricity for every other purpose than house lighting. The total gas sold in 1922 was 4·2 p.ct. less than in 1921, though the number of accounts issued showed an increase of 18,000 over 1921. The average amount paid per client per month exhibited a decrease of $2.05 paper per account, which was equal to a decrease of $724,072.30 paper—about £55,000 at present exchange—in the income from gas sales alone. Another reason for the Board taking a more hopeful view of the situation was that the Company were at last reducing their heavy stocks of coke. An arrangement had been made with a retailing firm in Buenos Aires, which had so far been satisfactory; and he hoped that in a short time they would see their large piles of coke disappear. Coke, of course, deteriorated by keeping; and when they could sell it direct from the retorts, they would make more money. The Directors were studying a scheme for making gas from oil; and if they eventually decided to make use of it, they would diminish the output of coke to what they needed for their own purposes. The average price per cubic metre of gas sold during 1921 was 25·32 cents paper; while this year they were able to reduce it, under the sliding-scale, to 21·39 cents paper—an average reduction of 3·93 cents paper per cubic metre. The cost of coal, which in 1921 averaged £4 0s. 1d. per ton, during the past year decreased to £2 10s. 6d., a difference of £1 9s. 7d. per ton; and the cost of gas oil decreased from £10 12s. 8d. per ton to £8 13s. 1d. in 1922. The cost of distribution had increased by £3000, chiefly due to the larger amount of work done in connection with the repair and maintenance of meters and cookers, the issued numbers of which had in each case increased by 20 p.ct. The chemical products department showed an increase of £5979 11s. 11d. in the profit obtained during the year, which might be taken as satisfactory in these days of business stagnation.

FIGURES FROM THE ACCOUNTS.

The balance of profit and loss revenue, £66,937, was only £570 better than the corresponding figure of 1921; while interest received from the purchasers of their electric section was £501 lower, at £17,358, owing, of course, to the progress of the amortization of the principal debt. The debits to profit and loss showed very little divergence from the 1921 figures. There was a reduction of £1025 in the London expenses, which had been cut to the very bone. The balance of the account, being the net profit for 1922, amounted to £5108, against £968 in 1921, an increase of only £4140; and this slight improvement was almost entirely due to a reduction in expenses. The first debentures outstanding amounted to £341,400, as against £408,900, a substantial decrease of £67,500, due to sinking-fund operations. The usual sinking-fund provisions had been made for the River Plate and Buenos Aires new debenture stocks. With regard to the assets side of the balance-sheet, there was an increase of £9405, being the net additions to the plant during the year. It was, of course, impossible to avoid some additions to the plant, mains, &c.; but their financial position had obliged them to keep capital expenditure to the lowest possible figure.

THE OUTLOOK.

When in the Argentine, he saw a great deal of the country, and was glad to observe in every direction signs of progress. He came away with the feeling that the country was still forging ahead at a great pace, and that there was no present fear of any serious crisis there. The City of Buenos Aires was still growing, and was very prosperous. The present low value of the Argentine peso in the international markets affected them seriously, because their revenue was in pesos, and they had to provide sterling for all their purchases of coal and materials, and for the service of the debentures, so that the actual depreciation of about 7⅞d. per gold dollar, or 14 p.ct., meant a heavy loss to them. They could only hope that matters would right themselves, and that quickly. The following cable (received on July 28) contained the latest news from the other side: "Our position steadily improving, due to gas sales. First half of this year increase over last year is 16½ p.ct., or say 1,800,000 cubic metres. July increase over last year is 17 p.ct. Number of gas accounts issued first half of this year has increased by 16,609. Total quantity of gas sold 1922 was 23 million cubic metres. Expect to sell 27 million during this year; but unless cheaper gas can be produced, 36 million per annum must be sold before we can return to reasonable profits. Are trying to make new contract for lighting which, if we can obtain, will greatly assist in improving situation."

Mr. H. E. JONES (Vice-Chairman) said that with greater satisfaction than he had ever felt in seconding this resolution, he begged to second it that day.

Mr. W. H. SKEEL expressed his admiration of the work that had been done by the Chairman and his colleagues in the interests of the undertaking.

Mr. TAYLOR asked whether it would be possible, during these critical times, for the shareholders to have a half-yearly statement of the position of affairs. With regard to the remarks that had been made on the subject of the staff, he presumed there had not been any irregularities in Buenos Aires.

The CHAIRMAN said the proprietors should have the statement asked

for. There had been nothing at all in Buenos Aires in the nature of irregularities.

The resolution was then carried unanimously.

Mr. Ross Pinsent was next re-elected a Director, on the proposition of the Chairman.

The Vice-Chairman, moving the re-election as a Director of Sir Albert Bowen, said they must all be heartily thankful to the Chairman for having persisted, with the usual vigour of his intellectual as well as his physical nature, in working the Company round the corner which he told them they had now turned. His strenuous labours were deserving of their warmest recognition.

Mr. C. P. Ogilvie seconded this; and it was agreed to.

The Auditors (Messrs. George A. Touche & Co.) were also re-appointed, on the proposition of Mr. E. C. Humphreys, seconded by Mr. Skeel.

Proposed by the Chairman, a vote of thanks was passed to the General Manager and staff in Buenos Aires and the Secretary and the staff in London.

A Shareholder remarked that, when in Buenos Aires recently, he was very much struck with the able way in which the Company were being served there, considering all the difficulties which had to be contended with. The staff were doing everything they possibly could to bring the Company round and make it a paying proposition. He hoped the question of leakage would receive attention.

The Vice-Chairman, at the request of the Chairman, dealt with the subject of leakage—pointing out that, with a smaller make of gas than previously, the proportion of leakage from the same mains was naturally greater.

On the motion of Mr. Humphreys, seconded by Mr. Claud Anderson, the Chairman and Directors were cordially thanked for their services.

The Chairman, in acknowledgment, said he hoped and believed there would be a better story to tell next year.

TRADE NOTES.

A New Vee-Reg Valve.

We learn from Messrs. Engineering Specialists, Ltd., of Craven House, No. 121, Kingsway, W.C. 2, that they have brought out a new grade of "vee-reg" valve for universal use. The "universal" type "vee-reg" valve has been manufactured in response to many requests from engineers who, having discovered the value of the high-pressure valves made by this firm, require a fine-adjustment valve to operate at normal pressures. Among the chief features of this new production may be mentioned the fine regulating action, which gives a delicate control of the steam passing. As the valve face and seat are protected, these vital parts have considerably longer life than is usually the case, and, also, they remain tight for long periods. The initial cost compares favourably, we are informed, with that of ordinary valves. The "universal" pattern is designed comfortably to withstand 150 lbs. steam pressure.

The Eastbourne Gas Order.

At a meeting of the Eastbourne Town Council last week, the Finance Committee reported that in reference to the Eastbourne Gas Order, a letter from Mr. A. Valon stated that, in his opinion, the additional new stock capital of £50,000, which the Gas Company ask power to raise, is not required. A letter from the Parliamentary Agents was also read, advising that the Corporation should object to the Company being granted power to raise further capital, on the ground that it would keep them away from Parliament or the Board of Trade for too long a period, that the proposed extra 1d. per therm for gas supplied in the new area of supply is not a sufficient extra charge, that the result of sales of stock should be notified to the Town Clerk, that the existing provisions of the Company's Acts protecting the Corporation with regard to the breaking-up of streets should apply to clause 30, and on various other grounds. It was resolved that notice of objection to the application generally, and in particular on the grounds advised by the Parliamentary Agents, be given under the Common Seal of the Council, and further that application be made to the Board of Trade to revise the standard price of gas supplied by the Eastbourne Gas Company.

Cheaper Gas at Stourbridge.—At a meeting of the Stourbridge Town Council last week, the Gas Committee recommended that the price of gas for power purposes be reduced by 3d. per 1000 c.ft., for lighting purposes by 2d., and by 2d. on each 5s. collected from prepayment meters. Alderman S. Fiddian, in presenting the report, said that the Gas Committee hoped to be able to make further reductions, but at the present time they had to face an advance in the price of coal. As the price of gas now represented an advance of about 50 p.ct. on pre-war rates, it would compare very favourably with the cost of most other commodities.

New Tar-Distillation Plant at Mossley.—A tar-distillation plant, which has been erected at the Mossley Gas-Works, was recently opened by the Mayor of Mossley (Councillor J. Ogden, J.P.). Mr. Chambers, on behalf of Messrs. Chambers and Hammond, of Halifax, the makers of the plant, said there was no question as to the progressive tendency of the Mossley Corporation. Before this installation, he understood, crude tar was dispatched 30 miles for conversion into a suitable preparation for roads. These transport charges were not economic; and Mossley would now save 15s. a ton on these charges alone. Mr. Bennett (Gas Engineer to the Corporation) had insisted on a definite guarantee as to the efficiency of the plant, continued Mr. Chambers. The plant erected was guaranteed to deal with 10 tons of crude tar per 12 hours, and to have a fuel consumption not greater than 100 lbs. of coke per ton of tar treated. Actual test figures, however, had given 11 tons 14 cwt. of tar distilled in 12 hours for a coke consumption of 90 lbs. per ton.

THE NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

Once again there is little or nothing in the way of change to report from this market. The tonnage position has certainly somewhat improved, and, though London trade is in many instances still at a standstill, collieries on the whole are in a better position for the next week or two than they have been of late. All the same, it is a weak market for this month at any rate; and best gas would probably be obtainable on the basis of about 24s. 6d. f.o.b. It is difficult, however, to give a price, as so much depends upon the position of any individual colliery at any particular time. At such prices as this, too, there is not always very much margin over production costs.

Business for forward has again been at a standstill. There has been a good deal of inquiry, but very little actual business can have been fixed up. Merchants and others have been asking prices for such periods as September-June. Collieries are still hopeful that the present slump is only temporary. The usual prices asked are 26s. to 27s. f.o.b. for better qualities, and a shilling or two less for others, with no disposition on the part of fitters to cut these figures.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From a Local Correspondent.

The gas-coal market in Yorkshire and Lancashire remains quiet; but, as previously reported, contracts are being effected at figures slightly in advance of those of last year.

The shipping section reports that the Germans are buying a limited quantity of nuts; but the high rate of exchange naturally prevents their doing any extensive business. There is a general feeling of uncertainty abroad in regard to the Belgian and French trades, and it may be some little time before this is overcome.

There is no apparent change in the house-coal section. The situation abroad is so uncertain that British industries have no confidence in regard to forward business; and orders for their products are scarce. This undoubtedly affects their coal consumption; and in some cases it is reported that large firms are working from day to day, and that, in consequence, they are unable to fix up their coal supply for more than a few weeks. The iron and steel trades, which are a criterion of the state of the coal market, are not in a position to place orders for coal, in view of the fact that they may have to reduce their working hours very considerably in the near future.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

For some time past activity in the coal trade in the Midland coalfields has been abating, and this week the movement has been further accentuated. The miners will "play" practically the whole of the week. This, however, will cause no inconvenience, for industrial concerns have supplies in stock to start work after the holidays. Slacks, which for a time were rather tight, can now be had in sufficient quantities to meet all needs. The export demand, in so far as it affects this district, has disappeared, and output is more than sufficient to cover all the home requirements. Nuts, beans, and industrials generally are a dull market; and there is also a decline in consumption of gas coal. There is a fairly steady absorption of domestic coal by far-seeing householders who are laying in stocks. Some concessions have been offered for this class of business, to the extent of about 2s. a ton.

Whitworth Vale Gas Company.—It was reported at the half-yearly meeting of the Company last Wednesday that the revenue account for the six months ended June 30 showed a profit of £630; and there was a disposable balance of £582. The dividends declared were at the rates of 7 p.ct. per annum on the original shares, and 5 p.ct. per annum on the "B" shares, less income-tax.

Yorkshire Junior Association Visit to Wombwell.—We are asked by the Hon. Secretary (Mr. F. A. C. Pykett, Gas-Works, Mulcture Hall Road, Halifax) to say that copies of the photograph taken in connection with the Wombwell visit of the Association can be obtained by members upon application to him. The prices of the photograph, according to size, are 3s., 4s. 6d., and 5s. 6d.

Further Reduction at Croydon.—The Croydon Gas Company intimate that a reduction of four-fifths of a penny per therm will be made in the price of gas in October, making it 9d. in the "Croydon" and 9⅘d. in the "Caterham" area—equal to 3s. 9d. and 4s. 1d. per 1000 c.ft. respectively. The reductions in price effected since 1921 represent a gain to consumers of £216,000 per annum.

Imperial Continental Gas Association Claims.—There has been received by the Imperial Continental Gas Association from the Clearing Office (Enemy Debts) a sum of £188,900 3s. 1d., being a second payment (less commission) on account, in respect of the compromise award of £1,550,000 in settlement of the outstanding balance of the Association's German claims, under the Peace Treaty.

Teignmouth Gas Department.—In presenting his report for the year ended March 31, Mr. H. Higham (Engineer and Manager) stated that the year's working had resulted in a small net loss of £122, making the credit balance £2841. The price of gas had been reduced from 5s. 10d. to 5s. per 1000 c.ft. Gas sales showed an increase of 2,454,000 c.ft., or 5 p.ct.—and this in spite of the establishment of a competitor in the Electric Lighting Company. The output of gas was 38,084,000 c.ft. to ordinary consumers, and 15,094,300 c.ft. to slot consumers—a total of 53,178,300 c.ft. The total gas made was 64,041,000 c.ft., as against 60,702,000 c.ft. last year. The amount of coal carbonized was 3507 tons. Tar realized £646, compared with £822 for the previous year. The total capital outstanding on the gas department at March 31 was £17,953.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 7.

The position of pitch remains without change, and the price is steady at about 150s. per ton. There is a fair amount of inquiry for creosote, and the market is firm at about 10d. per gallon. Solvent naphtha 95-160 is quiet at about 1s. 10d. per gallon. Pure toluole is at about 2s. 3d. per gallon. Pure benzole is about 1s. 8d. to 1s. 9d. per gallon. Other products are without change.

Tar Products in the Provinces.

Aug. 7.

Markets for all articles are stagnant owing to the holidays.

The average values for gas-works products during last week were: Gas-works coal tar, 86s. 3d. to 91s. 3d. Pitch, East Coast, 142s. 6d. to 147s. 6d. f.o.b. West Coast—Manchester, 140s. to 145s.; Liverpool, 141s. to 146s.; Clyde, 141s. to 146s. Benzole 90 p.c.t., North, 1s. 2½d. to 1s. 3½d.; crude 65 p.c.t. at 120° C., 10d. to 10½d. naked at makers' works; 50-90 p.c., naked, North, 1s. 7d. to 1s. 7½d. Toluole, naked, North, 1s. 7d. to 1s. 8d. nominal. Coal tar crude naphtha in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 3½d. to 1s. 5d. Heavy naphtha, North, 1s. 5½d. to 1s. 7½d. Creosote, in bulk, North, liquid, 8d. to 8½d.; salty, 7½d. to 8d.; Scotland, 6¾d. to 7¼d. Heavy oils, in bulk, North, 8¼d. to 9d. Carbolic acid, 60 p.c., 3s. 4d. to 3s. 5d. prompt. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.c., purely nominal; "B" unsaleable.

Sulphate of Ammonia Prices.

The British Sulphate of Ammonia Federation, Ltd., state that they have decided to offer special inducement to buyers to take early delivery this season, and are therefore prepared to allow a rebate of 10s. per ton on all orders for August delivery which reach them before the 18th inst., and which are placed in accordance with their June circular. The same offer applies also to orders already given for July or August delivery. The effect of this will be to reduce the price for July-August delivery to £14 5s. per ton for neutral quality, basis 25¼ p.ct. ammonia.

The Federation have further decided to offer sulphate of ammonia for September delivery at £14 10s. per ton for neutral quality in fine friable condition, free from lumps, basis 25¼ p.ct. ammonia, delivered to consumer's nearest station or wharf in Great Britain, for prompt cash payment, in lots of 4 tons and upwards.

Limited quantities of ordinary quality will be available in some districts, and will be sold at 23s. per ton less than the above prices basis, 25¼ p.ct.

It is understood that quantities purchased at these prices will be used for home agricultural purposes only.

Gas Testing in London.

The Public Control Committee reported to last week's meeting of the London County Council that, up to the date of the passing of the Gas Regulation Act, 1920, the Council were empowered to test gas only in the areas of the Gas Light and Coke Company, the South Metropolitan Gas Company, and the Commercial Gas Company. Under the Act in question, the Council are the gas-testing authority for the whole of the County of London, and are empowered to appoint gas examiners for that area, and to enter into such arrangements as they think fit with other local authorities as to the joint appointment and employment of gas examiners. Regular tests are consequently now made of the gas supplied by the South Suburban Gas Company and the Wandsworth, Wimbledon, and Epsom District Gas Company, in addition to that supplied by the three larger Companies named above. There are sixteen testing places in various parts of the county. Gas examiners whose names are on the approved panel are at present authorized to test only in the area of the three Metropolitan Companies. It is accordingly necessary to extend the terms of their appointments so as to enable them to test at any testing place in the county. It is also desirable that the inspecting gas examiner should be similarly authorized. The conditions of appointment and remuneration will in each case remain unaltered. The Council agreed with the Committee's recommendation—"That Mr. B. R. James, Inspecting Gas Examiner in the Public Control Department, be appointed, under the Gas Regulation Act, 1920, and any other Acts relating to gas testing, an examiner for the various testing places in the County of London; and that every person whose name is on the panel of gas examiners in the Public Control Department be appointed, under the Gas Regulation Act, 1920, and any other Acts relating to gas testing, an examiner for the various testing places in the County of London."

Metropolitan Gas Company of Melbourne.—Messrs. John Terry & Co. (agents for the Company) have received from the Metropolitan Gas Company of Melbourne (Australia) a cabled advice informing them that the profits for the half-year to June 30 last were £58,680, *plus* an amount of £23,500 refunded by the Income-Tax Commissioners, after reconsideration of the allowance for depreciation in previous years. A dividend of 6s. 6d. per share has been declared for the half-year, a sum of £15,000 has been transferred to the reserve fund, and a balance of £71,000 has been carried forward. Dividends will be payable in Melbourne probably on the 1st inst., and drafts to absentee shareholders will be posted by the first mail thereafter.

CALORIFIC POWER AT A GLANCE.

Alexander Wright
& CO., LTD.,
WESTMINSTER, S.W.1.
SOLE LICENSEES.

Messrs. Robert Dempster and Sons' (Elland) Sports Club.

The members of Messrs. Robert Dempster and Sons, Ltd. (Elland) Sports Club held their first sports and gala day last Saturday, when a large and enthusiastic gathering, including members of the Elland Council and representatives of the leading industrial concerns in the town, assembled on the extensive grounds adjoining Rosemount Ironworks. The Club was formed only last year, and, owing to the generosity of the Directors of the firm, possesses finely equipped premises and fields, comprising pavilion, football field, cricket field, bowling green, and provision for tennis courts. The Committee are to be congratulated on the manner in which they organized the entertainments on Saturday. The Elland Silver Band gave selections during the afternoon, and played for dancing in the evening. Prior to the presentation of the prizes, Mr. J. W. Broadhead (as President) said he was very pleased the Club had proved a big success, and that the facilities which the firm had provided were so highly appreciated. The Board felt they owed it to the employed to try to make their lives more happy—anyhow by way of recreation; and they were very pleased when the opportunity arose to provide and equip the sports ground. In large industrial undertakings like theirs, a great deal depended on the fitness of the men and on mutual good feeling; and there was nothing better than sport to bring these about. He was glad to think the Sports Club was bringing together the men and staff and the management, because it meant a higher level of efficiency and better results, enabling them to keep the works more fully employed than might otherwise be the case. It was only when they were fully employed that they could enjoy their leisure time to the utmost. He was glad the members were contributing sufficient to make the Club self-supporting, and gratified to find that the funds were in such a flourishing condition as to enable them to run their own sports gala without financial assistance from the firm. He was pleased to see all the members of the Board present. He hoped the sports would continue year by year as long as the firm existed.

Loughborough Gas Charges.

It was reported at the last meeting of the Loughborough Town Council that the Gas Committee had been in communication with the Board of Trade regarding maximum prices to be charged per therm, the Committee having urged that the rates proposed by the Board of 13d. inside the borough and 14·2d. outside were too low. The Board, however, declined to reconsider the figures, and the Committee raised no further objection. The Committee recommended the Council to erect new offices and showrooms for the department, at an estimated cost of £3280. Dissatisfaction was expressed by Councillor M'Ghie as to the suggested reduction in the price of gas being only 4½d., he considering that it might be made 6d. without any risk. He suggested that the Board of Trade, in fixing 13d. as a maximum, apparently thought there was ample room for a reduction. There was still much disappointment in the town regarding the gas service; and he thought the Committee ought to tell them exactly what was the difficulty. There was no utility in spending £4000 on new premises to show gas stoves and fittings, if they could not supply the necessary good gas for consumers. It was proposed that the question of price should be referred back to the Committee for further consideration, and that they should be instructed also to consider a reduction of stove and meter rents. Mr. Lloyd James (the Chairman of the Committee) explained that certain difficulties were being experienced at present in connection with the works; and he anticipated that, when these had been surmounted, as they would be in a little time, consumers would find they were getting real value for their money. In his opinion, the Committee could not at this moment safely reduce the price below 4s. 10½d.; but as soon as it was feasible, every member on the Committee was as keen as those on the Council to see the price reduced. The amendment to refer the matter back to the Committee was rejected, and the minutes were confirmed; it being determined to make application to the Ministry of Health for sanction to the raising of loans of £4000 for the new offices and £4255 for expenditure on stoves, meters, and extensions of mains.

Halesowen Rural District Public Lighting.—The question of whether or not the street-lamps in the Halesowen rural district should be lighted during the winter was recently considered at a meeting of the local Council. The Authority were anxious to accede to the request of the parish councils to return to pre-war conditions; but the quotations received from the three Gas Companies serving the area were adjudged excessive. The suggestion was made that, in order to protest against the high terms, there should be a strike, and that the streets should be without lights. In reply to the Council's application for prices for lighting the whole of the lamps from one hour after sunset to midnight from Sept. 30 to April 20—except in December and January, when the lamps would be alight throughout the night—the Cradley Heath Gas Company submitted a tender for £3 5s. per lamp; the Halesowen Gas Company, for £3 per lamp; and the Blackheath and Rowley Gas Company, for £3 7s. per lamp. After some discussion, the Council declined to accept the terms, and appointed a deputation to meet the Companies with a view to endeavouring to obtain a reduction.

At Alva the price of gas has been reduced from 5s. 10d. to 5s. 5d. per 1000 c.ft.

At a recent meeting of the Coventry City Council a revised scale of gas charges was adopted giving a reduction of 5d. per 1000 c.ft.

The price of gas at Wigan has been reduced by 8d. per 1000 c.ft. During the past 45 years the gas undertaking has contributed over £230,000 to the relief of the rates.

The Directors of the South Suburban Gas Company have declared a dividend, for the half-year ended June 30, at the rate of 6 p.ct. per annum on the 5 p.ct. ordinary stock.

Excavations in Maiden Lane, W.C., made for the laying of telephone wires, caused a subsidence of the pavement and broke a gas-main. Four people sleeping over a shop owned by Mr. F. Marino were rendered ill by the escaping gas.

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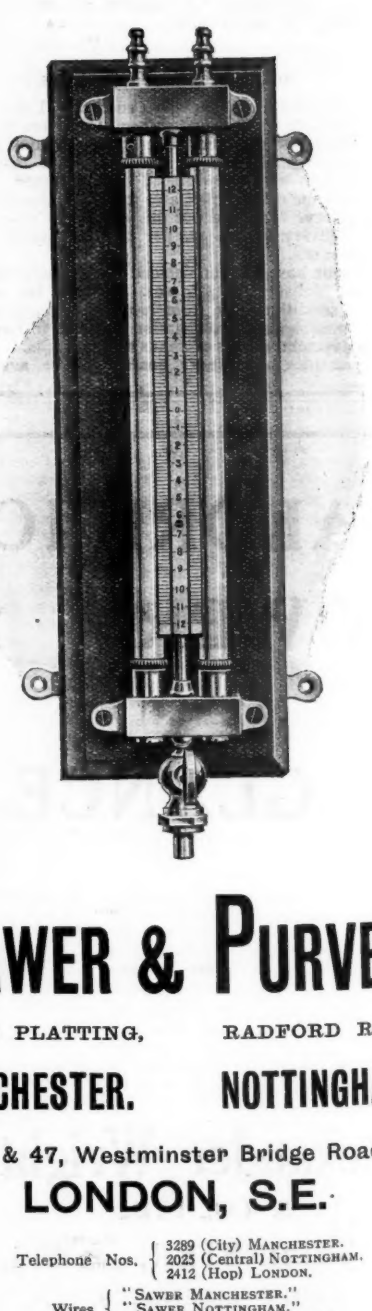

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STOCK MARKET REPORT.

THE week just closed on the Stock Exchange was in its general characteristics much on a par with the one it succeeded. It opened very weakly and full of misgivings; accounts were being closed by unwished-for sales in all quarters from the gilt-edged aristocrats down to the miscellaneous plebeians. Tuesday brought no sign of amendment except in one or two Home Government issues, Home Rails were out of favour, the Foreign Market was flat, and the usually popular Oil Market was avoided. This state of things continued next day, and the divergent English and French views in regard to the Ruhr question aggravated it, to the distress of the Foreign Bond market. At last, on Thursday, a slight improvement was perceptible, and a ray of sunshine made things look more hopeful, even in the Ruhr direction. Home Government issues rallied a little, and French did the same upon improvement in the exchange.

Business in the Gas Market was very quiet, and is likely to continue so at this season; but there was no sign of weakness, and prices hardly moved.

The following transactions in gas during the week were recorded: On Monday, European 8½, Gas Light ordinary 96⅞, 97, Imperial Continental 158½, 159½, 160, Liverpool 7 p.ct. preference, 107, 108¾, Primitiva 5s., ditto 5 p.ct. preference 30s., South Metropolitan 97½, ditto 5 p.ct. preference 98, ditto 3 p.ct. debenture 61½, Tottenham "A" 122, Wandsworth Wimbledon 112½. On Tuesday, Buenos Aires 4 p.ct. debenture 56, Commercial 4 p.ct. 94½, ditto 3½ p.ct. 94½, ditto 3 p.ct. debenture 58, 59, 62, Gas Light ordinary 96½, ditto 3½ p.ct. maximum 66, ditto 4 p.ct. preference 80, 81, Primitiva 6s. 7d., ditto 5 p.ct. preference 30s., South Suburban 103, ditto 7 p.ct. debenture 101. On Wednesday, Alliance and Dublin 73, 73⅛, Bombay 5⅛, Bournemouth "B" 12¼, 12½. Brentford "A" 5 p.ct. 104, British 12, 12¼, ditto "B" 11½, 11⅝, 12¼, Croydon sliding-scale 105, Gas Light ordinary 96½, 96¾, 96⅞, 96⅝, ditto 4 p.ct. preference 80, Imperial Continental 160, Liverpool 5 p.ct. 90, 90½, Malta and Mediterranean 3⅜, Primitiva 5 p.ct. preference 30s., South Metropolitan 96½, 96¾, 97½, 97⅝. Tottenham "B" 101½, Leatherhead 5 p.ct. 8⅝. On Thursday, Brentford "B" 102, 103, Cape Town 7, 7⅛, Gas Light ordinary 96, 96⅛, 96⅝, 96⅞, Imperial Continental 158, 159½, Primitiva 5 p.ct. preference 30s., 31s., South Metropolitan 96⅜, 97, 97½, 97⅜, ditto 6½ p.ct. debenture, 107½, South Suburban 103, 103½, Leatherhead 5 p.ct. 9, Ottoman 7 p.ct. preference 1, 1⅛.

In the Money Market, there was less agitation and quick change, supply and demand being nearer to a fair equilibrium. This state of affairs lasted till the close, when a somewhat augmented demand was met without difficulty. Discount rates were not much changed. Silver was well supported; India being a steady buyer. The Bank of England rate is 4 p.ct., as fixed on July 5.

PRE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Transactions.
£			p.c.					
231,978	Stk.	Feb. 22	—	5%	Aldershot 5 p.c. max. C.	..	74—79	...
190,492	,,	,,	4	4%	Do. 4 p.c. Pref.	..	72—77	...
1,551,868	,,	Apl. 5	2½	5%	Alliance & Dublin Ord.	59—64	72—77	73—73⅛
374,000	,,	July 12	4	4%	Do. 4 p.c. Deb.	76—79	62—67	...
280,000	5	May 17	7½	4/-	Bombay, Ltd.	5⅛—6⅛	5—5⅛	5⅛
100,000	5	Feb. 22	16	8/-	Bournemouth Gas & Water { B 7 p.c.	..	12—13	...
383,110	10	,,	7	7/-	Bournemouth Gas & Water { Pref. 6 p.c.	15—15½	12—13	12¼—12½
115,000	10	,,	6	6/-	Bournemouth Gas & Water { 4 p.c. Deb.	13¾—14	10½—11½	...
162,065	—	June 28	—	4%		..	77—82	...
992,045	Stk.	July 12	14	6t/-	Brentford A Consolid.	261—266	100—105	104
734,920	,,	,,	11	6t/3	Do. B New	204—209	100—105	102—103
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	83—88	...
221,400	,,	June 14	4	4%	Do. 4 p.c. Deb.	91—93	77—82	...
214,775	,,	Mar. 8	11	11¼%	Brighton & Hove Orig.	208—213	175—180	...
244,200	,,	,,	8	8½%	Do. A Ord. Stk.	154—159	130—135	...
1,272,500	Stk.	July 26	5	5%	Bristol 5 p.c. max.	..	97—98*	...
570,000	20	Mar. 22	12½	10/-	British A Ord.	44—45	12—13	...
10,000	10	June 28	—	7/-	Do. 7 p.c. Pref.	..	11½—12½	...
120,000	Stk.	,,	4	4%	Do. 4 p.c. Deb. Stk.	88—90	74—79	...
220,335	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	56—59	56
100,000	10	May 17	—	—	Cape Town & Dis., Ltd.	1¼—2½	6¾—7⅛	7—7⅛
100,000	10	May 3	—	4/6	Do. 4½ p.c. Pref.	4—6	6—7	...
100,000	Stk.	June 28	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	70—75	...
237,860	,,	,,	—	7½%	Cardiff 7½ p.c. Deb.	..	106—111	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	...
313,280	,,	July 23	5/9/4	6o/-	Commercial 4 p.c. Stk.	106—108	94—97*	94½
560,000	,,	,,	5½	6o/-	Do. 3½ p.c. do.	103—105	94—97*	94½
475,000	,,	June 14	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	56—61	58—62
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	37—41	...
200,000	,,	Dec. 14	7	4%	Do. 7 p.c. Pref.	115—118	72—77	...
660,000		Mar. 8	—	6%	Croydon sliding scale.	..	103—106	105
284,975		,,	—	5%	Do. max. div.	..	83—86	...
492,270	Stk.	—	6	4½%	Derby Con. Stk.	123—125	..	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	..	...
209,000	,,	Apl. 5	—	5%	East Hull 5 p.c. max.	..	..	...
1,002,180	10	July 12	10	5/0	European, Ltd.	17½—18	7¾—8½	8½
16,546,120	Stk.	July 26	4/17/4	52/-	Gas { 4 p.c. Ord	98—102	90—98*	96—97
2,600,000	,,	,,	3½	35/-	Gas { 3½ p.c. max.	76—79	65—68*	66
4,062,235	,,	,,	4	4%	Light { 4 p.c. Con. Pref.	96—99	79½—81½*	80—81
4,761,930	,,	June 14	3	3%	and { 3 p.c. Con. Deb.	72½—74½	60—63	...
130,000	,,	Dec. 11	10	10%	Coke { 10 p.c. Bonds	..	..	...
—	—	—	—	—	{ 7½ p.c. Ilford Deb.	..	..	...
82,500	,,	Mar. 8	5	6s/7½	Hastings & St. L. 5 p.c.	..	92—97	...
258,740	,,	,,	3½	50/7½	Do. 3½ p.c.	87—89	75—78	...
70,000	10	May 17	11	10%	Hongkong & China, Ltd.	16½—16¾	15—16	...
86,600	Stk.	Mar. 8	9	9½%	Hornsey 7 p.c.	..	147—152	...
1,976,000	,,	May 31	9	£17	Imperial Continental	150—160	157—162	158—160
404,800	,,	Feb. 8	3½	3½%	Do. 3½ p.c. Deb. Red	84—86	76—78	...
235,242	,,	Mar. 8	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	97—102	...
1,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord.	..	..	90—90½
600,000	,,	Mar. 22	—	7%	,, 7 p.c. Pref.	..	107—110	107—108½
165,736	,,	Feb. 22	7/5/6	80/-	Maidstone 5 p.c.	..	107—112	...
63,480	,,	June 28	—	3%	Do. 3 p.c. Deb	..	52—57	...
75,000	5	June 14	6	3/6	Malta & Mediterranean Met. of Melbourne { 4½ p.c. Deb.	4¼—4⅜	3⅞—4	3⅞
100,000	100	Apl. 5	4½	4½%		99—101	97—100	...
341,920	Stk.	May 17	4	4%	Montevideo, Ltd.	11½—12	50—55	...
1,875,892	,,	July 26	4½	4½%	Newcastle & Gatsh'dCon.	98½—99½	84½—85½*	...
250,166	,,	Feb. 22	—	4%	Do. 4 p.c. Pref. Stk.	..	71—73	...
529,705	,,	June 28	3½	3½%	Do. 3½ p.c. Deb.	82—83	70—72	...
15,000	10	Aug. 26	—	7/6	North Middlesex 10 p.c.	..	..	...
55,940	10	Mar. 8	7/14/0	7/8⅞	,, ,, 7 p.c.	14—15	12—13	...
300,000	Stk.	May 3	8	8%	Oriental, Ltd.	117—122	97—102	...
188,120	Stk.	June 28	—	78/9	Plym'th & Stonh'se 5 p.c.	..	106—110	...
60,000	50	Mar. 8	13	65/-	Portsea Island, B	128—131	103—108	...
100,000	50	,,	12	60/-	Do. C	118—121	100—105	...
290,069	5	—	8	—	Primitiva Ord.	5½—6	⅛—¼	5/—6/9
499,960	3	—	5	—	Do. 5 p.c. Pref.	4½—5	1½—2	30/—31/-
321,600	100	June 1	4	4%	Do. 4 p.c. Deb.	91—93	73—75	...
600,000	Stk.	July 26	4	4%	Do. ,, ,, 1911	..	56—59*	...
346,198	,,	June 28	4	4%	River Plate 4 p.c. Deb.	85—87	56—59	...
150,000	10	Mar. 22	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	5½—6½	...
125,000	50	July 2	5	5%	San Paulo { 5 p.c. Deb.	47—49	38—41	...
135,000	Stk.	Mar. 22	10	5%	Sheffield A	223—224	104—106	...
209,984	,,	,,	10	5%	Do. B	222—224	104—106	...
525,500	,,	,,	10	5%	Do. C	220—222	103—105	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	..	..	...
90,000	10	May 31	9	9/-	South African	10½—11½	8—10	...
6,609,895	Stk.	July 26	5/4/0	50/-	South Met. Ord.	111—113	96—98*	96½—97½
250,000	,,	July 12	—	5%	Do. Red. Pref.	..	97—99	98
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	61—63	61½
734,000	,,	Mar. 8	—	6½%	Do. 6½ p.c. Deb.	..	106—108	107½
91,500	,,	Feb. 22	8½	8½%	South Shields Con. Stk.	157—159	129—131	...
1,087,795	,,	,,	6	6%	S'th Suburb'n Ord. 5 p.c.	114—116	102—105	103—103½
368,837	,,	June 28	5	5%	Do. 5 p.c. Deb. Stk.	116—118	95—100	...
647,740	,,	May 3	5	5%	S'th'mpt'n Ord. 5p.c. max.	99—102	88—91	...
121,275	,,	June 28	4	4%	Do. 4 p.c. Deb. Stk.	..	72—77	...
250,000	,,	Mar. 8	—	70/-	Swansea 7 p.c. Pref. Stk.	..	103—105	...
200,000	,,	June 28	—	6½%	Do. 6½ p.c. Deb. Stk.	..	105—107	...
120,000	,,	July 26	—	8%	Tottenham { A 5 p.c.	135—138	120—125*	122
782,275	,,	,,	6	6½%	Tottenham { B 3½ p.c.	115—117	100—105*	101½
181,255	,,	June 14	4	4%	District { 4 p.c. Deb.	87—89	78—82	...
258,251	Stk.	Mar. 22	5	5%	Tynemouth 5 p.c. max.	108½—109	90—92	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	July 12	8½	90/-	Wandsworth A 5 p.c.	151—156	126—131	...
255,636	,,	,,	6½	75/-	Do. B 3½ p.c.	129—134	112—117	...
108,075	,,	,,	—	63/-	Do. C.	—	97—102	...
140,865	,,	,,	—	63/-	New Ordinary	—	97—102	...
352,000	,,	,,	6½	71/3	Wimbledon 5 p.c.	117—122	109—114	112½
98,000	,,	,,	6½	76/3	Epsom 5 p.c.	121—126	112—117	...
88,416	,,	June 28	3	3%	3 p.c Deb. Stk.	66—69	57—60	...

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